The accuracy of death certificates

Implications for health statistics

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Summary.

The death certificate is an important source of data on disease incidence, prevalence and mortality. It should therefore be as accurate and complete as possible. Death certificates from 433 autopsied hospital patients were reviewed and matched against the results of post-mortem examinations. Significant discrepancies between the two documents were observed in 50% of patients. In 25%, the immediate cause of death was incorrectly stated on the certificate, having been assigned to a different organ system in the majority of those cases. In 33%, there was disagreement on major disease other than the immediate cause of death. In 9%, the death certificate was signed before the autopsy was performed. The extent of disagreement was largely independent of whether the certificate was signed before or after the autopsy. We conclude that: (1) there is a significant discrepancy between autopsy diagnoses and entries on death certificates; (2) disagreement is not due to unavailability of autopsy data at the time of completion of the certificate; (3) death certificates should be completed or amended utilizing data gained at autopsy.

Key words: Death certificate – Autopsy – Diagnostic discrepancy – Health statistics

Introduction

Health statistics, in particular national mortality statistics, and data on disease prevalence in society, are derived largely from death certificates. In completing death certificates, physicians shape the content of these important files, destined to play a key role in decision making processes regarding the distribution of resources in the fields of medicine and health. It is therefore of vital importance that death certificates be as accurate and complete as possible. Inaccurate, vague or incomplete certificates provide misleading data regarding diseases and causes of death in society. The general consensus among workers in health statistics and epidemiology is that death certificates represent a key source of information on causes of death (Kircher 1990).

Several papers have addressed the accuracy of death certificates. Utilizing different approaches and methodologies, these studies have concluded that the death certificate may not be a reliable source of information regarding causes of death and, therefore, not ideally suited as a source for decision making in public health (Barclay and Phillips 1962; Mitchell et al. 1971; Cameron and McGoo1gan 1981a; Gobbat0 et al. 1982; Edwards Dismuke and VanderZwaag 1984; Kircher et al. 1985). A complete post-mortem examination, in conjunction with pertinent clinical information, is undoubtedly the best available standard against which to evaluate the accuracy of death certificates. In certain aspects, Iceland, with its homogeneous population, comprehensive health care and virtually complete disease registration, is ideally suited to investigations of the epidemiology of disease and the accuracy of its registration. As it has elsewhere (Roberts 1978), the autopsy rate in Iceland has declined during the past two decades. Yet approximately 30% of all deaths in the country are still subjected to an autopsy. The aim of this investigation is to elucidate the agreement between death certificates and the results of post-mortem examination.

Materials and methods

We analysed, retrospectively, all autopsies performed during two entire years, 10 years apart, 1976 and 1986, at the Department of Pathology, University of Iceland. This institution is responsible for over 85% of all autopsies in Iceland. Excluding stillbirths, perinatal deaths and forensic cases, a total of 434 hospital autopsies were analysed. Copies of death certificates, written by the patients' hospital physicians, were obtained from the Statistical Bureau of Iceland. We matched death certificates with provisional and final autopsy reports and compared the following parameters: (1) overall diagnostic discordance; this was further subdivided according to whether the disagreement was on the (1a) immediate cause of death or on (1b) other major diseases. In cases of discrepancy
regarding the cause of death, we ascertained whether the discrepant causes of death had been assigned to the (1c) same or different organ system. We defined immediate cause of death as "... that injury or disease which kills a person at a particular time and place" (Wetli et al. 1988). The immediate cause, so defined, was then matched against item I$_{10}$, "Direct cause", on the International Form of Medical Certificate of Cause of Death (WHO 1979). We defined major disease as any disease that might "... initiate a series of events that lead directly to an immediate cause of death" (Wetli et al. 1988). Major disease, so defined, was matched against item I$_{69}$, "Underlying antecedent cause", and/or item II, "Other significant conditions contributing to the death but not related to the disease or condition causing it", on the International Form. We further investigated the difference in concordance as to whether the death certificate was signed (2a) before the autopsy or (2b) on the same day or subsequent to the autopsy. We also noted whether the death certificate (3) indicated that an autopsy had been performed. The chi-squared test was used for statistical analysis.

### Results

The total number of autopsies was 434, 190 from 1976 and 244 from 1986. In 1 instance, a death certificate could not be obtained. Thus, 433 autopsies, 190 from 1976 and 243 from 1986, remained for analysis. There were 222 females and 211 males. Table 1 shows the number and percentage of discrepant diagnoses. A major overall discrepancy between the death certificate and the autopsy diagnosis was evident in 50% of cases. In 25.4% of the total, the cause of death was incorrectly stated on the death certificate when compared to the post-mortem result. There was no statistically significant difference between the results for the two years ($P > 0.5$). Table 2 shows the concordance between autopsy report and death certificate, separated as to whether the death certificate was signed before or after the autopsy. There was no statistically significant difference in overall concordance when broken down into certificates signed before or after autopsy ($P > 0.5$). For other major diseases, the reduction in disagreement after (32.4%) when compared with before (44.7%) issue of the death certificate was apparent but not statistically significant ($0.50 > P > 0.10$). In 410 cases (94.6%) the death certificate indicated that an autopsy had been performed. In 3 cases (0.7%), "no" was written as an answer to the question if an autopsy had been done when in fact it had been performed and in 20 cases (4.6%), the question was left unanswered.

### Discussion

The death certificate is a source of important data on the incidence, prevalence and mortality of disease. The allocation of financial resources within the health sector is governed by information largely derived from this single source. Thus, cardiovascular disease and cancer, the most common diseases causing death in modern society, appropriately receive the largest share of funds for medical research.

It is therefore highly desirable that the physician generating such a crucial set of data should have at his/her disposal all pertinent clinical and pathological information related to a person's illness and death. Equally desirable, having received this information, the physician should use it when drafting the death certificate. Of all the data available to a physician writing the death certificate, the post-mortem diagnosis is the single most important source of information. Despite its limitations, the autopsy remains the standard against which the correctness of premortem diagnoses may best be assessed.

Several investigators, each utilizing approaches somewhat different from the other, have observed discrepancies between diagnoses entered into death certificates and diagnoses generated at autopsy. Kircher and associates (1985) compared death certificates and autopsy reports on 272 patients. In over half (55%), the cause of death as stated on the death certificate differed from that on the autopsy report. In over half of those (29%