

Information on death certificates: cause for concern?

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Abstract

Aims—To assess the frequency with which the cause of death on death certificates included the relevant details requested of certifying doctors, especially in deaths due to malignant disease, but also including certain other deaths where specific information would be expected to be included.

Methods—Consecutive series of certificates attributing death to malignancy, pneumonia, an acute cerebrovascular event, and renal failure were inspected and compared with the categories identified in the International Classification of Disease. Review of clinical notes and of laboratory data was used to determine the number of cases in which detailed histological diagnoses were available.

Results—A histological diagnosis was available in 79.1% of cases of deaths due to malignancy, but was recorded on only 23.6% of certificates. Haematologists performed best (69.6%) and general surgeons worst (2.8%). The sites of primary tumours were recorded in detail in only 23 of 89 cases of tumours of the large bowel (22/36), lung (1/35) and stomach (0/18). In cases of pneumonia the causative organism was recorded in only 4 of 330. In cases of an acute cerebrovascular event one of 70 was recorded as being due to haemorrhage. A distinction between cerebral or pre-cerebral arterial occlusion (embolism/thrombosis) and cerebral haemorrhage was not recorded in any of the other cases. In cases of renal failure a cause was not recorded in 75 of 95.

Conclusions—Despite consistent encouragement to record all relevant details on death certificates this study shows that doctors fail to do so in most cases. Such a failure diminishes information available to the Office of Population Censuses and Surveys, affecting mortality statistics and gives further cause for concern about standards of certification. Means by which the standard of certification might be improved are discussed, including screening of certificates by a medically qualified person prior to registration.

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The inclusion of detailed diagnoses on death certificates is valuable for producing high quality mortality statistics. The World Health

Organisation (WHO), in its guidance to physicians on the use of the International Form of Medical Certificate of Cause of Death, has consistently requested the inclusion of all relevant detail.¹ Indeed, judging by its exhortations to doctors in that guidance, it is lack of detail which the WHO seems to regard as the most important deficiency on certificates. In addition to general statements requesting succinct use of accepted pathological nomenclature, the WHO specifically requests the precise primary site and histological type of tumours and, in infections, the organism isolated. The provision of this information is requested in the "notes to medical practitioners" located in the preface to books of death certificates² and by the Office of Population Censuses and Surveys (OPCS), to which falls the task of coding causes of death from death certificates in this country.³ Such information is usually either known to the certifying doctor or is available from the clinical notes, which should be to hand when completing a death certificate. Compliance with such requests is facilitated by the use of the International Classification of Diseases, also published by the WHO, and updated on a decennial basis, whose coding scheme is used internationally in order to produce national mortality statistics from death certificates.⁴

The aim of this study was to assess what proportion of hospital completed certificates contained the requested information in cases of malignant disease and selected other causes in which detail would seem appropriate and valuable.

Method

Causes of death recorded on death certificates from a large district general hospital and a teaching hospital were reviewed. These certificates recorded deaths where no referral to the coroner had been made and no postmortem examination had been carried out. Consecutive series of causes of death were compiled where death was attributed to malignant disease, pneumonia, an acute cerebrovascular event, and renal failure.

For cases of malignant disease the existence of a histological diagnosis prior to death was established by checking for a histopathology report and, in the absence of such a report, by reviewing the clinical notes.

The number of cases in which a tissue diagnosis enabling a morphological classification to be made of greater detail than carcinoma or lymphoma was recorded. The numbers of death certificates giving no detail other than

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“malignancy unspecified” were recorded, as were diagnoses of “carcinoma” and “lymphoma” as well as those certificates where the full histological diagnosis was given.

The primary sites given were compared with the lists of primary sites classified in the International Classification of Disease (ICD) (9th revision; still in use at the beginning of this study) in order to establish to what extent certification allowed detailed ICD coding.

Death certificates citing “pneumonia” as the cause of death were reviewed and the number of certificates detailing the organism responsible was determined, along with the cases where more pathological detail of the nature of the pneumonia was supplied.

Certificates attributing death to an acute cerebrovascular event were examined, noting the number where the aetiological division into embolic/thrombotic and haemorrhagic events had been made—an important distinction considering the therapeutic use of thrombolytics.

Certificates attributing death to renal failure were examined for evidence of a causative factor.

The certificates used to investigate the recording of pneumonia, cerebrovascular accidents (CVA) and renal failure were from the teaching hospital alone, which was mainly composed of acute medical and surgical specialties and did not contain a geriatric unit.

Results

Histological diagnoses were available in 79.1% of deaths due to neoplastic disease, but only one in four of these diagnoses was recorded on the death certificate (table 1). Certificates from patients dying while under the care of a haematologist were much more likely to record the histology, which may reflect clinical involvement in making a tissue diagnosis. When haematological diagnoses are excluded, only one in seven certificates records available histology, falling to only one in 35 patients dying while under the care of a general surgeon (table 2).

Table 1 Information given on death certificates stating malignant disease: tissue diagnosis available and unavailable

	Tissue diagnosis available 140 (79.1%)	No tissue diagnosis available 37 (20.9%)
Certificates giving histology	33 (23.6%)	2 (5.4%)
Certificates giving carcinoma/lymphoma only	99 (70.8%)	25 (67.5%)
Certificates giving malignancy, site unknown	8 (5.7%)	10 (27.1%)

Table 2 Information given on death certificates stating malignant disease: tissue diagnosis available (sample groups)

	Haematology	All except Haematology	General surgery
Certificates giving histology	16 (69.6%)	17 (14.6%)	1 (2.8%)
Certificates giving carcinoma/lymphoma only	7 (30.4%)	92 (78.6%)	29 (90.5%)
Certificates giving malignancy, site unknown	0 (0.0%)	8 (6.8%)	6 (16.7%)
Total	23	117	36

The primary site is equally poorly addressed (tables 3, 4 and 5). Of 94 cases of carcinoma of the colon, lung and stomach, only 23 (24.4%) recorded a detailed site. In stomach tumours none of the certificates recorded a detailed site. Similarly, all but one of the lung tumour sites failed to enable coding beyond a general, “bronchus or lung, unspecified”. Terms are used which do not appear in the ICD listing (for example, bowel cancer) or which are too general or which combine categories (for example, colorectal cancer).

The omission of detail is a problem that applies to diagnoses other than malignancy. This study has looked in a simple fashion at other conditions in which information is easily available for hospital patients and might be thought important. Table 6 shows that of 330 cases of pneumonia the organism was identified in only four cases and that in 307 cases the diagnosis was limited to pneumonia or bronchopneumonia, with the organism unspecified despite over 80 categories of pneumonia being identified by the ICD.

The incorporation of information from *x* ray films might also be expected to be recorded on death certificates. Computed tomography (CT) scans are now routinely performed in order to distinguish infarction due to cerebral/pre-cerebral arterial occlusion from cerebral haemorrhage. Table 7 shows that such information rarely finds its way to the certificate as only one certificate attributed the CVA to haemorrhage and none to vascular obstruction. Indeed, only eight of 70 certificates record an aetiology, with 57 giving no exact site (either within the brain itself or detailing specific vascular involvement) or underlying cause.

Finally, deaths from renal failure seem to be a particular problem, with only 20 of 95 cases recording the aetiology (table 8). When obstructive causes are excluded, this falls to only six cases (out of 81). Of the seven certificates giving “acute renal failure” as the cause of death, none gave an underlying cause although this would seem to be necessary to allow registration.

Discussion

That mortality statistics are valuable is not in dispute. That death certificates have shortcomings is also not in dispute; indeed, there have been a number of publications in recent years cataloguing the various aspects of death certification that have appeared, to various authors, to be unsatisfactory: errors in clinical diagnosis when compared with necropsy diagnoses³; lack of understanding of the principles underlying certification⁶; failure to read instructions given in the “notes to medical practitioners”⁷; error or confusion within pathological sequences^{6,8}; and failure to include relevant diagnoses or therapeutic intervention.⁹ Such inadequacies may result in the certificate showing no true underlying cause of death or seeming to warrant referral to the Coroner for other reasons.¹⁰

Many of these faults do not affect mortality data. Of those that do, most are well known to

Table 3, 4 and 5 Description of primary sites of tumours given on death certificates and example ICD codes available (not including the histological classification). An asterisk denotes that the description enables detailed coding

Tables 3 Large bowel tumours

Site stated	Number	ICD sites (12):
Bowel	3	hepatic flexure
Colon	10	transverse colon
Colorectal	1	descending colon
Caecum*	4	sigmoid colon
Sigmoid*	3	caecum
Rectum*	15	appendix
		ascending colon
		splenic flexure
		other
		colon
		rectosigmoid
		junction
		rectum unspecified

Table 4 Lung tumours

Site stated	Number	ICD sites (7):
Lung	16	trachea
Bronchus	18	main bronchus
Right main bronchus*	1	upper lobe, bronchus or lung
		middle lobe, bronchus or lung
		lower lobe, bronchus or lung
		other
		bronchus and lung, unspecified

Table 5 Stomach tumours

Site stated	Number	ICD sites (12):
Stomach	18	cardia
		pylorus
		pyloric antrum
		fundus
		body
		lesser curvature, unspecified
		greater curvature, unspecified
		other
		stomach, unspecified

Table 6 Certificate entries in deaths due to pneumonia and example ICD codes available. An asterisk denotes that the description enables detailed coding

Certificate entry	Number	ICD codes (41)—for example:
Lobar pneumonia*	12	Viral – adenovirus, RSV, parainfluenza, other, unspecified
Influenzal pneumonia*	2	Bacterial – <i>Pneumococcal</i> , <i>Klebsiella</i> , <i>Pseudomonas</i> , <i>H influenzae</i> , <i>Streptococcus</i> , <i>Staphylococcus</i> , other, unspecified
Aspergillus pneumonia*	1	Other agents
Measles pneumonia*	1	Pneumonia in infectious disease – measles, CMV, ornithosis, whooping cough, tularemia, anthrax, aspergillosis, systemic mycoses, other
Aspiration pneumonia*	2	Bronchopneumonia
Hypostatic pneumonia*	5	Pneumonia, organisms unspecified
Bronchopneumonia, organism unspecified	274	Influenza
Pneumonia, organism unspecified	33	Aspiration
Total	330	Allergic/eosinophilic
		Congenital
		Lipoid
		Passive/hypostatic
		Postoperative
		Rheumatic
		Rubella
		Pneumonia due to fumes/vapours

Table 7 Certificate entries in deaths due to cerebrovascular accidents and example ICD codes available. An asterisk denotes that the description enables detailed coding

Certificate entry	Number	ICD codes (19)—for example:
No further information	57	Intracerebral haemorrhage
Brain stem	4	Cerebral thrombosis
Haemorrhagic	1	Cerebral embolism
Embolitic	0	Occlusion and stenosis of precerebral arteries – basilar artery, carotid artery, vertebral artery, multiple and bilateral, other
Due to hypertension	5	Unspecified + further 10 codes of unusual cerebrovascular disease—for example, code 436 “Acute but ill-defined cerebrovascular disease – includes: apoplexy, apoplectic; attack, seizure cerebrovascular accident NOS, stroke”
Due to DM/atherosclerosis	3	
Total	70	

Table 8 Certificate entries in deaths due to renal failure and example ICD codes available. An asterisk denotes that the description enables detailed coding

Certificate entry	Number	ICD codes (more than 80)—for example:
Chronic renal failure	68	Acute glomerulonephritis – proliferative, rapidly progressive, other, unspecified
Hypertension*	4	Chronic glomerulonephritis – proliferative, membranous, membrano-proliferative, rapidly progressive, other specified lesion—for example, amyloid, SLE, unspecified
Diabetes*	2	Nephritis or nephropathy not specified as acute or chronic – glomerulonephritis, cortical necrosis, medullary necrosis, with other specified lesion—for example, diabetes, gout
Obstruction	14	Hypertensive renal disease
Acute renal failure	7	Acute pyelonephritis
Total	95	Chronic pyelonephritis
		Hydronephrosis
		Calculus

the OPCS, and corrections, including rules of coding, are used in order to increase the utility of the data despite the recognised deficiencies.^{3 11 12} However, absence of detail is a fault, which, if not remedied by the provision of such detail at a later date, cannot be otherwise rectified. This is clearly recognised and explains, first, the exhortations to doctors by the WHO and the OPCS to include all relevant information and, second, the facility whereby the OPCS may write to the certifying doctor, or the consultant under whose care the patient died, to ask for further information. Whilst seeming superficially to be a satisfactory arrangement, this is time consuming and inconvenient for both the doctor concerned and the OPCS, with ensuing cost implications. Furthermore, such requests are not universally successful.¹³

The present study shows that despite the easy availability of histological diagnoses to certifying doctors, such information is not used by them on death certificates. Such certificates also fail to include organisms responsible for infection and basic pathological detail; the most common terms used are basic terms which do not permit detailed coding. Encouragements to describe the sites of primary tumours have been issued since 1938¹ (when requests to differentiate between cancers of the cervix and corpus uteri were largely ignored) and include a more recent specific request to differentiate between different sites within the stomach,¹⁴ which, from this study, seems to have been completely ignored. It might be argued that cancer registries record such details of tumours but these organisations rely on the OPCS to provide detail from death certificates.¹⁵ Moreover, death certificate diagnoses of malignancy have been held responsible for artefactual trends in incidence of specific tumours¹⁶; indication of tissue diagnosis confirmation may help to alleviate such errors. In the absence of adequate detail on death certificates further research is necessary on the part of the registry to enable accurate diagnoses to be recorded.

The other conditions examined also fail to be recorded in detail on death certificates. It would be impossible from the figures given here to establish the incidence, or changes in the incidence, of primary cerebral haemorrhage as a cause of “stroke”, of atherosclerosis as a cause of chronic renal failure, or of specific forms of pneumonia in hospital patients dying of specific disorders.

This study has, admittedly, not looked at the actual numbers of organisms identified by the laboratory in each case nor has it looked at the CT findings in the cases of CVA. Given the figures, this cannot be regarded as a major problem as it is inconceivable that a causative organism is isolated in only 1.2% of cases or that only one CT scan was performed in 70 cases. It is also limited to a single geographical area but death certification practice has been shown to be uniform countrywide¹⁷ and it is unlikely, therefore, that these results may not be viewed in a national context.

The ICD is an extremely detailed classification and it might be considered un-

reasonable to suggest that every doctor should certify every death so that the most accurate classification possible might be made. Indeed, such degree of detail could be considered in excess of the statutory requirement for the doctor to state the cause of death "to the best of his knowledge and belief".¹⁸ However, it would seem reasonable that basic, readily available and relevant information be included in order that statistical information available from death certificates be optimised. The degree of information required could probably benefit from clarification and it would seem that this study confirms the recognised need for improvements in death certification practice.

Previous suggestions to improve the quality of death certification have concentrated on the importance of adequate education¹⁹ and on the involvement of senior staff in the completion of death certificates.²⁰ Over a decade has passed since the joint report of the Royal Colleges of Physicians and Pathologists recommended that house officers should not complete death certificates²¹ without any sign that this is to be implemented. It is far from certain, however, that such a policy would materially affect matters. Research has shown that senior staff fare no better than junior staff at completing death certificates.²² Furthermore, one study investigating the value of postgraduate education in death certification practice was not wholly successful, failing to deliver significant improvement²³; others have shown that retrospective analysis of death certificates on consultation with the certifying doctor failed to release further information or attain alteration of certificates.²⁴ Such studies suggest that there is no "quick fix" for the problem and that even postgraduate education programmes on the subject might not result in significant improvement even if there was a will to institute such programmes. Moreover, this is not a problem peculiar to Britain; there is a worldwide difficulty in obtaining optimal standards of certification where the attending physician, in isolation, completes the certificate.⁵ One answer, which has been applied in Finland, is to require review of all death certificates by a regional "screener" prior to registration.²⁵ In such a system whilst the attending doctor would complete a death certificate this would be reviewed by a regional screener—a doctor with special experience in the medicolegal aspects of death and in certification practice. This would have two effects: first, it would provide an

effective "long-stop" ensuring adequate enquiry into a death—a function currently expected of the lay Registrars of Births and Deaths and which has been shown, not unexpectedly, to be imperfect⁶—second, it would ensure that certificates were correctly completed and that adequate information was supplied. Such a system could not ensure that the cause of death was necessarily the correct one, but it could ensure that the view a clinician wished to give was given in full.

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