

# Death certification by doctors in non-metropolitan Victoria

**OBJECTIVE** To examine the completeness and accuracy of death certification by general practitioners, specialists and resident medical officers (RMOs) in non-metropolitan Victoria.

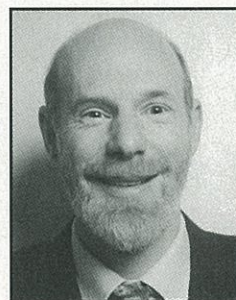
**DESIGN** An examination of the death certificates written by a representative sample of community and hospital doctors and comparison with the clinical history.

**SETTING** The Ballarat statistical district.

**RESULTS** Eighteen percent of the death certificates at initial assessment, were unsatisfactory (the percentage for those written by RMOs were significantly higher). After review of the clinical record, 27% of certificates were found to inaccurately represent the cause of death, (again the percentage for RMOs was higher) Eighteen percent of certificates required a change of code.

**CONCLUSION** Monitoring the health of the public relies in part on information gained from death certificates. It is thus of concern that such a high percentage of death certificates are inaccurate to the extent that they are incorrectly coded. Consideration should be given to new educational initiatives and to the promotion of the existing toll free telephone advice service to doctors.

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Death certification was introduced in the United Kingdom (UK) in 1837 and to the states of Australia between 1838 and 1855.<sup>1</sup> The purpose continues to be the provision of proof of death and mortality statistics. These statistics are a primary source of data for those interested in public health. Their reliability depends on the accuracy of disease diagnosis, certification and certificate coding. Errors have been reported at all three stages.<sup>2,3</sup> Several studies between 1978 and 1993 suggested that within hospitals in the UK, 20–29% of death certificates were inaccurate or incomplete.<sup>4,5,6</sup> An Australian hospital study published in 1993 was critical of

death certification procedures and suggested that the error rates in Australia may be similar to those in the UK.<sup>7</sup> A study of all 430 death certificates written during one month in Western Australia found a major error rate of 16%, which was consistent across city and country and across teaching hospitals and other sites.<sup>8</sup> Studies performed in Australia on death certificates written for particular diseases have demonstrated major deficiencies.<sup>9,10</sup> These studies suggested that an examination of the death certificates of a representative sample of community and hospital doctors was required which considered possible differences between types of doctors and compared the death certificates with clinical histories.

## Method

### Sample

The sample was restricted to the Ballarat statistical district, and the registration list of the Medical Board of Victoria, supplemented by local hospital employee lists and the membership list of the Ballarat and District Division of General Practice. The doctors were grouped into general practitioners (GPs), specialists and resident medical officers (RMOs), and study participants chosen by simple random sampling within each stratum. An oncologist with a large number of cancer certificates was excluded from the study.



## Collection technique

The information which the doctors participating in the study had written on death certificates over the three year period from 1990 to 1992 was reviewed by a coder at the Australian Bureau of Statistics (ABS) Health Research Unit. All the GPs and specialists involved were interviewed by one of the researchers, about all the written certificates, with the doctors encouraged to refer to their clinical records. As RMOs were unavailable for interview, the records of their patients were examined by the author, David Brumley.

## Information sought

The following information was sought at either interview, or from records: availability of record; place of death; interval between last consultation and death; whether autopsy was performed; agreement between information from death certificate and that obtained from interview or record review, and the level of diagnostic support for the certified cause of death.

## Level of evidence

The level of evidence available was classified as autopsy, histological confirmation, diagnostic evidence (such as ECG support for a diagnosis of myocardial infarction) clinical evidence (a record of examination of the patient with clinical signs to support the diagnosis), patient history only (a situation such as a report from the patient of typical ischaemic chest pain, but no diagnostic or clinical support recorded) and a category for those cases in which there was no supportive history or examination evidence for the recorded diagnosis.

## Assessing certificates

The certificates were compared with the information thus obtained, and classified as unsatisfactory if:

- the diagnosis on the death certificate

**Table 1. Comparison of causes of death found in study with those for Victoria and the region\*.**

Cause of death	Study	Percentage of all deaths	
		Victoria ('90-'92)	Region ('85-'89)
Heart disease — AMI	18.2	19.3	18.4
Heart — other ischaemic	9.1	9.4	10.0
Heart failure	1.0	2.7	2.8
Cerebrovascular disease	9.1	10.9	10.6
Circulatory disease	7.0	7.8	8.4
Cancer trachea, bronchus	2.8	5.4	4.6
Cancer colon	4.6	3.0	2.5
Cancer breast	1.1	2.2	1.9
Cancer — other	11.9	16.5	14.9
Chronic bronchitis, emphysema	9.1	5.9	6.9
Pneumonia	1.4	1.4	1.9
Other respiratory disease	1.4	1.0	1.2
Brain failure	7.7	1.9	2.3
Digestive system disease	5.6	3.6	3.7
Endocrine disease	0.4	3.1	2.8
Nervous system disease	1.4	1.5	1.7
Genito-urinary disease	2.8	1.4	1.4
Other	6.3	4.1	4.2
Total	100	100	100

Deaths from trauma such as motor vehicle accidents, other accidents, suicide and external causes were not included in the comparison.

\*Region: Ballarat Statistical Subdivision

was incorrect or unsupported by any evidence;

- if major diagnoses were omitted;
- the underlying diagnosis was incorrectly written in the second part of the death certificate;
- or if there was a long time interval between the last consultation and death.

The 'gold standard' for the acceptability of the certificates was published by the ABS.<sup>11</sup> If the GPs and specialists could reach agreement with the author on the changes which needed to be made to death certificates considered to be unsatisfactory, a new certificate was written and resubmitted to the ABS for coding. If agreement could not be reached, the

death certificate was submitted to a review panel comprising a physician and a surgeon in active practice and not otherwise involved in the study. The researcher provided GP input into the review panel.

All subjects in this study gave informed consent to their involvement. The research was approved by the Human Research Ethics Committee of The University of Melbourne.

## Results

The sample of doctors participating in the study was found to be representative of those in non-metropolitan Victoria in terms of both sex and year of graduation. One hundred and five



**Table 2. Reasons for the ABS querying certificates**

	Percentages
Diagnosis not sufficiently specific	37
Stated cause not an illness	5
Illogical or confusing cascade of causes	14
Possible missed underlying cause	42
To exclude traumatic death	2
	43

**Table 3. Levels of evidence for the certified underlying cause of death by type of doctor**

Level of evidence	Total	Percentage		
		GP	RMO	Specialist
Statement not a diagnosis	<1	0	0	1
No evidence	5	8	<4	<3
Patient history only	1	0	<4	0
Clinical evidence	26	24	21	30
Diagnostic evidence (other than below)	48	40	58	49
Histological confirmation	17	27	8	14
Autopsy confirmation	5	0	14	4
	259	96	66	98

certificates written by 9 GPs, 78 certificates written by 6 RMOs, and 102 certificates written by 6 specialists were studied. The causes of death from the 285 death certificates completed by the 21 doctors participating in the study were compared with those of the region (Ballarat Statistical Subdivision) and Victoria as a whole as contained on the HealthWIZ database<sup>12</sup> (Table 1). The distribution of deaths between the study population, the region and Victoria was significantly different ( $P<0.001$ ) with a higher than expected proportion of deaths from a few causes, namely cancer of the colon, chronic bronchitis/emphysema, digestive disease and genito-urinary disease, but particularly from brain failure in the study population compared with the region and/or Victoria. The larger proportion of deaths from brain failure, chronic bronchitis and emphysema in the study group was likely to be due to two of the selected specialists being employed in geriatric care. The percentage of cancers found in the research group was lower than expected, and probably due to the exclusion of an oncologist.

### Place of death

Overall 16% of deaths occurred at home, and GPs were responsible for all but one certificate for home deaths. General practitioners wrote certificates for approximately a third of nursing home deaths and a quarter of hospital deaths.

### Death certificate evaluation prior to interview

The ABS queried 18% [95% (CI 14–23)] of certificates overall. The query rate for GPs [14%, 95% (CI 7–20)] and specialists [13%, 95% (CI 7–20)] were similar and significantly lower than that for RMOs [25%, 95% (CI 15–35)]. The reasons given by ABS for querying death certificates are set out in Table 2.

### Results of interview

All participating GPs and specialists agreed to be interviewed. Records were available on 259 of the 285 of the patients whose death certificates were selected for examination. A smaller number of records were available for patients of RMOs (84%) than for GPs (92%) or specialists (96%). There were no notable differences in the causes of death between patients with and without records.

### Interval between last consultation and death

The longest interval found was 221 days, for a death certificate written by a GP. The mean was 4 days overall, being 9 days for GPs, but only 1 day for RMOs and 2 days for specialists.

### Autopsy rate

The overall rate of autopsy was only 5%. The rate was greatest for RMOs (14%). No GPs had an autopsy performed on their patient.

### Levels of evidence for the recorded diagnosis

This is shown in Table 3. In about one quarter of cases for all these groups of doctors the diagnosis was made on clinical grounds. The most common diagnoses in the group where no evidence was available were myocardial infarction and ischaemia, renal failure and carcinoma of the colon.

### Unsatisfactory certification rate after clinical review.

The unsatisfactory certification rates for RMOs [42%, 95% (CI 36–48)] was significantly greater than for specialists [13%, 95% (CI 9–17)] and GPs [22%, 95% (CI 17–27)] ( $P<0.01$ ). When the overall rate is weighted to reflect the contribution each



**Table 4. Unsatisfactory certificates by reason and type of certifying doctor.**

Reason	GP	Percentage	
		Resident	Specialist
Incorrect diagnosis	3	3	2
Unsupported diagnosis	5	3	1
Absent diagnosis Part I	8	10	3
Absent diagnosis Part II	2	1	0
Time error excluding absent time intervals	1	1	0
Underlying cause of death in Part II	1	3	4

group makes to the number of doctors practicing in non-metropolitan Victoria, the overall percentage of unsatisfactory certificates in the general doctor population was estimated to be 27% (22–32). Table 4 shows the reasons for the death certificates being judged as unsatisfactory following clinical review.

### Combined query and unsatisfactory review rates

The percentage of certificates for which there was an initial query from the ABS and/or an unsatisfactory clinical review was [29% 95% (CI 20–39)] for GPs, [51% 95% (CI 39–63)] for RMOs and [21% 95% (CI 13–29)] for specialists, with the percentage being significantly higher for RMOs than the two other groups ( $P < 0.01$ ).

### Panel review

The panel reviewed 15 death certificates and was able to reach agreement on a new certificate in 10 cases (60%).

### Change of code by ABS

The percentage of death certificates requiring a code change differed significantly ( $P < 0.01$ ) between GPs [17%, 95% (CI 10–25)], RMOs [27%, 95% (CI 16–38)] and specialists [9.4%, 95% (CI 4–16)].

When the results were weighted to reflect the contribution each group makes to the numbers of doctors practicing in non-metropolitan Victoria, the overall percentage of certificates requiring re-coding in non-metropolitan Victoria was estimated to be 18% (13–23).

### Discussion

The large percentage of errors in death certificates shown in this study is a concern because the information is an important source of data for public health. Errors are occurring in the way doctors complete the certificates, plus inaccuracies in the reporting of the actual cause of death. A significant percentage of certificates also have little supporting evidence for the reported cause of death.

The **first cause for concern** is the 18% of death certificates which the ABS were unable to code, and were required to query. This percentage is consistent with the proportion (16%) of death certificates found to contain major errors in another Australian study<sup>8</sup> and with the experience of the ABS. The majority of these queries arose because the death certificates were written in a way which prevented ABS staff from deciding on a

cause of death. The most common problems were the cause of death not being stated with sufficient specificity (for example, a death certificate stating "cancer of bowel") or an underlying disease not being reported. Queried death certificates do not comply with the guidelines published by the ABS for certification. In discussion with the doctors at the time of the study, it was clear that most doctors did not have knowledge of the ABS booklet explaining correct certification procedures, and had little or no training in this area of practice. Improving access to this information, coupled with prominent advertising of where and how it may be obtained would help improve certification knowledge.

The **second cause for concern** is the estimated 27% of death certificates judged to be clinically unsatisfactory for reasons of incorrect, absent or unsupported diagnosis. The GPs and RMOs were significantly worse in this area than the specialists. The GP is more often confronted with the conflicting pressures of not completing a certificate because there is insufficient evidence for the cause and wanting to avoid the distress to relatives of a coroner's inquiry. In discussion with GPs during the study, this was a major cause of concern.

GPs and specialists were allowed to consult their records during the interview. A previous study found that the same amount of information about medical conditions could be obtained from medical records as could be obtained from questionnaires which GPs completed with the help of their records.<sup>13</sup> Because RMOs had left the Ballarat hospitals, it was not possible to interview them and the record may have over-estimated the proportion of certifications which were based on inadequate evidence. However, this figure was the same for specialists and RMOs and it is unlikely that RMOs would perform better than specialists.



The level of diagnostic certainty required in writing a death certificate is a practical problem for the certifying doctor. This study shows that a third of death certificates rely on history and clinical judgment alone, and 6% of death certificates are written with no substantial evidence for the diagnosis at death. Examples are a death certificate reporting carcinoma of the colon in the case of a death with undiagnosed bowel bleeding. This would have been more appropriately recorded as "gastrointestinal bleeding, cause unknown". Another example was the sudden unexpected nocturnal death of a patient with a past history of ischaemic heart disease being ascribed to acute myocardial infarction. This certificate should not have been written at all.

This aspect of poor certification might be improved by placing a time limit to the interval between last consultation and death. There is no such limit at present. This would allow the GP to decline to write a certificate without appearing to be obstructive. Ideally this would require public education about the coroner's role, to avoid unnecessary distress to relatives.

Educational initiatives are widely suggested to the problems of death certification in the published literature. The majority of doctors in the study did feel inadequately trained, and reported little supervision in writing certificates as GPs. We also wonder whether doctors could see death certification as more important if the information from the certificates was compiled and feedback provided for each health region. A clinical audit of deaths in general practice as it is practised within hospitals would also focus more interest on the certificate.

Acknowledgments

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Did you know?

The Supplement — AusCouncil for Responsible Nutrition Vol. 5 No. 3

Folic acid is probably the commonest vitamin deficiency in Australia. It should be considered in the institutionalised elderly, chronic alcoholics, pregnant women, malabsorption syndromes and people on medications such as trimethoprim, pyrimethamine, methotrexate and sedatives.

Folic acid supplementation appears important for pregnant women to prevent neural tube defects, and it would also appear important in reducing a cardiovascular risk factor, namely an elevated plasma homocysteine concentration. Recent studies in ulcerative colitis patients have also found a reduction in bowel cancer with folic acid supplementation. Recommended doses for pregnant women are 400 µg per day, while the recommended daily intake for most women is 180 µg daily. Foods rich in folic acid include cabbage, lamb's liver, spinach and peanuts. Medium concentrations are in peas, egg yolks, oranges and wholemeal bread.



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