

many found in the environment. Monoclonal antibody typing, chromatography, membrane extraction, and enzyme and plasmid analysis may provide ways forward in identifying such strains.

The proceedings of the conference are expected to be published by the American Society for Microbiology at the end of the year.

JOHN T MACFARLANE

Consultant Physician,  
City Hospital,  
Nottingham NG5 1PB

<sup>1</sup> Sathapatayavongs B, Kohler RB, Wheat LJ, White A, Winn WC. Rapid diagnosis of legionnaires' disease by latex agglutination. *Am Rev Respir Dis* 1983;127:559-62.

## Death certification

The joint report by the Royal College of Physicians and the Royal College of Pathologists was given wide coverage in the national press but received scant attention in medical journals.<sup>1</sup> Apart from legal and social considerations, accurate certification is vital for the increasing amount of epidemiological research based on data derived from death certificates.<sup>2</sup>

Necropsy and death certification are so closely related that the two can hardly be considered separately. In the past quarter of a century many reports in Britain and overseas have shown that after necropsy the pathologist's opinion about the cause of death differs from that of the clinician in charge of the patient in a substantial proportion of cases.<sup>3-9</sup> This divergence is much greater in the elderly, in whom multiple diseases are common, and especially when neoplasms or cardiovascular or respiratory diseases were thought in life to have been responsible for the last illness.<sup>6</sup>

The necropsy can show only morbid anatomical and histopathological abnormalities, but the pathologist is expected—and knows he is expected—to give a cause of death. Death may, however, have resulted from biochemical disturbances or from cardiac arrest or an arrhythmia which cannot be recognised at necropsy, and conversely structural disease evident to the pathologist may have no relevance to the fatal outcome. The less consultation there is between clinician and pathologist the wider will be their disagreement.

Abnormalities such as symptomless gall stones, Paget's disease of bone, or a very early neoplasm may come to light for the first time at necropsy; while their presence may give a different perspective to the disease present, such findings have no bearing on the cause of death or the correctness of the management and treatment given during life.

In a few cases the necropsy may show the clinical diagnosis to have been totally wrong, but only rarely would different treatment have averted the fatal outcome<sup>10</sup>—a sad reflection on our therapeutic impotence.

Finally, some patients remain in whom the most careful examination, investigation, and surveillance during life fail to provide a diagnosis and exhaustive postmortem examination likewise fails to solve the mystery.<sup>10,11</sup> In particular, the cause of stillbirths and perinatal deaths is often impossible to ascertain,<sup>12-15</sup> and in such circumstances the certified cause of death must be speculative and is usually misleading as well as inaccurate.

The Brodrick report<sup>16</sup> argued that almost all deaths of which the causes are not known fall within the jurisdiction

of the coroner. Many coroners have standing orders for an automatic necropsy when a death is reported to them. Many other deaths, such as those due to alcohol or to occupational disease, are reported to the coroner. Yet if a clinician and pathologist cannot identify the cause of death the coroner almost certainly cannot either. A death certificate "cause unknown" is unlikely to be regarded with satisfaction by the relatives, the coroner, the clinicians, or anyone else concerned, so often a certificate is given for which there is no supporting proof or evidence. This may meet a social and legal need but is a false trail for research based on death certificates.

When death occurs at home necropsy is very unusual unless the general practitioner notifies the coroner. In fewer than 10% of deaths in hospital does the clinician arrange a necropsy with the consent of the relatives (that is, excluding those which are arranged by the coroner). Even in these circumstances the clinician and his team are by no means always present when the necropsy is carried out. Nevertheless, the total number of necropsies performed in England and Wales increased nearly three and a half times during the 30 years 1949-79—largely as a result of more coroners' necropsies being carried out on patients dying in hospital.<sup>17</sup> Unfortunately, these are often not as carefully conducted as are those performed at the request of a clinician, and only occasionally is a clinician present.

Clearly, therefore, abundant scope for error exists before the clinician or coroner takes up his pen to write the death certificate. In some patients the cause of death cannot be identified, in others it is wrongly ascribed by clinician or pathologist, and in yet others uncertainty remains because no necropsy has been done or it has not been done with sufficient care—for example, histological examinations may have been omitted. After the patient's death the relatives usually want the death certificate promptly so that they can make arrangements for cremation or burial as quickly as possible. Commonly the preregistration houseman is the only doctor available to complete and sign the certificate, and he is unlikely to have had much instruction in death certification during his undergraduate training or to have heard of the International Classification of Diseases. If he happens to be an overseas graduate he may be completely mystified by the entire procedure.

The registrar of births and deaths scrutinises each medical certificate to determine whether the death must be reported to the coroner before registration.<sup>18</sup> In some cases the relatives of the deceased may give information to the registrar which makes a reference to the coroner necessary. The registrar may also contact the certifying doctor or the coroner for clarification of doubtful points. Even so, when the certificates reach the Office of Population Censuses and Surveys about 400 of the 12 000 received on average each week are thought to indicate an inappropriate underlying cause of death. In 1982 there were 15 coders and six checkers handling these certificates; they are clerical officers (the present entry requirement being five O levels or better), with no medical training before appointment but who undergo a lengthy period of training in the coding section. There are only four medically qualified staff in the Office of Population Censuses and Surveys to whom doubtful certificates can be referred and they can know no more about the patient than what is stated on the certificate. Clarification is therefore sought from the certifying doctor, but only too often he has moved on to another appointment and no reply is received to the inquiry.

Regrettably, some experienced and able doctors tend to insert on death certificates only diagnostic labels which they

know will not be questioned rather than try to specify (to the best of their knowledge and belief) the terminal illness and its antecedent causes.

The second major sphere of error lies in the death certificate itself. The coders are bound by two sets of rules. The first is issued by the World Health Organisation and is of worldwide application. Some of the rules appear inappropriate to the needs of England and Wales, but in many developing countries many of those who die are not attended by a doctor. The second is a list of rules drawn up for the coders in the Office of Population Censuses and Surveys itself in order to minimise errors in the national mortality statistics. The coders can code only what is on the certificate, and as they have little medical knowledge they must adhere to the two sets of rules. Herein lies the third way in which error may arise.

The colleges' report suggested that the consultant's name should be stamped on the death certificate and that queries about the cause of death should be referred to him.<sup>1</sup> The Office of Population Censuses and Surveys will be exploring the implementation of this change. The consultant is much less likely to have "moved on" than his preregistration house officer, and not only will his reply be more informative but his interest in correct certification of his patients will doubtless be stimulated. His participation may, indeed, lead to more frequent submission of the "further information" which at present, despite completion of box B on the reverse of the death certificate, is rarely forthcoming. Proposals are being prepared for submission to the Secretary of State on the introduction of new certificates for use in stillbirths and deaths occurring during the first month of life.

Is it too much to hope that deans of undergraduate medical schools will ensure that death certification, the International Classification of Diseases, and the functions of the Office of Population Censuses and Surveys are included in the undergraduate syllabus and that postgraduate deans will promote similar instruction for general practitioners? The Working Party on the Medical Aspects of Death Certification would also like hospital staff to try to obtain necropsies on an additional 20% of patients dying in hospital. The Royal College of Physicians is planning a symposium on death certification for all the royal colleges later this year.

Finally, the Office of Population Censuses and Surveys will be sending to each newly qualified doctor in England and Wales a leaflet explaining how to complete a death certificate and the importance of its accuracy.

M R ALDERSON  
Chief medical statistician

Office of Population Censuses and Surveys,  
London WC2A 6JP

RICHARD I S BAYLISS  
Assistant director  
CYRIL A CLARKE  
Director  
A G W WHITFIELD  
Assistant director

Medical Services Study Group of the  
Royal College of Physicians of London,  
126 Albert Street,  
London NW1 7NF

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<sup>2</sup> Royal College of Physicians of London. Death certification and epidemiological research. *Br Med J* 1978;ii:1063-5.

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- <sup>18</sup> Anonymous. *Registration of births, deaths, and marriages regulations 1968.* London: HMSO, 1968. (Statutory Instrument No 2049: Regulation 51(1).)

## Of cats and women

Congenital toxoplasmosis was first described in 1939; yet it is clinically so rare that we still do not know whether it is preventable or whether treatment is effective. Dr Susan Hall has analysed recent Public Health Laboratory Service returns and has found much lower rates of congenital toxoplasmosis than 10 years ago (p 453). Is this because the true incidence is falling, or are doctors failing to diagnose the condition?

*Toxoplasma gondii* is a protozoan parasite found throughout the world. The sexual cycle takes place within the intestines of cats, which excrete oocysts during acute infections. The oocysts are ingested by many animals, including mice and birds, and the parasites multiply within tissue cysts in these intermediate hosts. If the animal flesh is eaten by a cat the cycle is completed. Humans are infected either from ingesting oocysts or by eating uncooked meat containing the parasite.

Human infection can be shown by serological methods.<sup>1</sup> The Sabin-Feldman test requires live *T gondii* and is usually performed in Public Health Laboratory Service laboratories. The fluorescent antibody test uses toxoplasma antigen from mouse peritoneal exudates, is simpler, and may be carried out in ordinary laboratories. The two tests probably measure the same antibody, whose titre rises to a maximum about four months after infection and may persist for a year or more. In Britain about 1% of the population show seroconversion each year,<sup>2-4</sup> so that the proportion of the population which is immune increases with age: it is about 30% in young adults. Infection is usually subclinical, though sometimes fever and swollen, tender cervical lymph nodes may persist for some weeks.

Apart from rare overwhelming infections in people with immunological deficiency disorders, toxoplasmosis causes most concern in the context of infections in young children. Relatively more is known about infection during pregnancy,