

older adults waiting for long-term placement should be explored further, as it is capable of being audited, though it is recognised that the present financial arrangements for nursing home and residential home care militate against rapid transfer despite an apparent excess of supply in these facilities in some areas.

Finally, perhaps not surprisingly, consultants were overwhelmingly in favour of retaining decision-making power over admission to and discharge from NHS beds.

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\*John Wattis, *Consultant/Senior Lecturer in Old Age Psychiatry*; Andrew Macdonald, *Senior Registrar* and Paul Newton, *Clinical Audit Manager, Leeds Community and Mental Health NHS Trust, The Mansion, Meanwood Park Hospital, Tongue Lane, Leeds LS6 4QB*

\*Correspondence

# Death certification in a psychiatric hospital

Emad Salib

**Aims and method** A retrospective review of death certificates issued at a large psychiatric hospital in North Cheshire during the 1980s and 1990s.

**Results** Dementia, which was the recorded clinical diagnosis in 78% of all deceased, was reported in 31% of death certificates, while other psychiatric disorders (22% of all deceased) appeared in only 2% of certificates. Autopsy appears to have very little or no value in improving the quality of death certificates in psychiatry.

**Clinical implications** The onus is on the clinicians to produce adequate death certificates. Recording chronic conditions present at death, such as dementia and other psychiatric disorders, in addition to those directly causing or contributing to death would improve the epidemiological value of death certificates.

Death certificates, despite their inadequacies, remain one of the most commonly used sources

of data for the estimation of the prevalence of most diseases. However, morbidity and mortality statistics that arise from death certificates are seriously flawed, mainly because of the omission of important materials (O'Sullivan, 1996). Certain diseases are grossly underestimated on the death certificates such as dementia (Burns *et al*, 1990; Macera *et al*, 1992). Possible sources of error in the use of statistics based on death certificates may arise from inadequate information provided on the certificate, errors in the pre-mortem diagnosis or non-documentation of the confirmed diagnosis on the death certificate (Macera *et al*, 1992). Deciding what should or should not be included on death certificates may be difficult and become a matter of opinion and not fact, which it purports to be. What needs to be recorded is not just the 'diseases or conditions directly leading to death', but 'with what diseases or conditions' did death occur (Ashworth, 1991). These conditions may not be directly related to

Table 1. Number of deaths, autopsies and hospital beds in Winwick Hospital 1980–1986 and 1990–1996

Year	Total death, n	Post-mortems, n (% of death)	Beds	Death/bed
1980 period	1356	134 (9.9%)		16% <sup>1</sup>
1980	229	19 (8%)	1600	14%
1981	221	15 (7%)	1490	15%
1982	214	15 (7%)	1370	16%
1983	187	19 (10%)	1200	16%
1984	176	20 (11%)	1140	15%
1985	189	25 (10%)	1100	17%
1986	177	21 (12%)	950	19%
1990 period	457	39 (8.5%)		15% <sup>1</sup>
1990	111	10 (9%)	590	19%
1991	108	9 (8%)	560	19%
1992	78	7 (9%)	470	17%
1993	59	5 (8%)	400	15%
1994	45	4 (9%)	360	13%
1995	30	2 (7%)	320	9%
1996	30	2 (7%)	300	10%

1. Mean values for review period.

death, but could be of importance to public health.

The main aim of this review is to examine cause of death of psychiatric in-patients, as reported in death certificates over two decades during which Winwick Hospital has retracted considerably. The effect of hospital retraction on patients' mortality, completeness of death certificates, the frequency and value of performing post-mortem examination in increasing the accuracy of death certificates are examined. The review also attempts to evaluate the extent to which mortality data underestimate prevalence of psychiatric conditions, particularly dementia.

## The study

Winwick Hospital is a 100-year-old psychiatric hospital receiving all psychiatric patients from the two districts in North Cheshire with a total population of 350 000. The hospital had a large population of ageing psychiatric long-stay patients. Beds have been reduced from over 2000 to less than 300 during the past 20 years and the hospital will be replaced by much smaller units later this year.

This retrospective review examined all death certificates issued at Winwick Hospital, Warrington in two periods of seven years each: 1980–1986 and 1990–1996. Data included all patients, long-stay or newly admitted, who died in hospital during the review period. The collected information included age, gender, duration of hospital stay, whether post-mortem was carried out, year and month of death, ICD-9 diagnosis (World

Health Organization, 1978) and recorded cause of death.

Cause of death was divided into: (a) direct cause of death, which is the same as Part 1a in the present death certificate form; (b) underlying cause of death leading to death (Parts 1b and c in death certificate form); and (c) associated conditions that existed at death and may have contributed to it, although not part of the sequence leading directly to death which corresponds with part II of death certificates. Where autopsy was performed, the cause of death identified by the pathologist was noted. For analysis, the diagnostic categories were recoded into major groups; dementia and all other psychiatric diagnoses added together.

## Findings

During the review periods a total of 1813 deaths occurred, 1356 (41% male and 59% female) in the 1980s review period and 457 (47% male and 53% female) in the 1990s review period. Mean age was 78.9 (s.d. 11) and ranged between 39 and 103, with mean age of 76 and 81 for male and female patients respectively. More than 94% of the deceased aged 60 and above. Over 55% of the deceased had been in-patients for more than one year (max. 56 years). Duration of hospital stay did not differ significantly between the two review periods, except for elderly psychiatric patients who died within a week of admission which had only been reported since 1985, shortly after the opening of an admission ward for dementia assessment. Psychiatric diagnosis included: dementia (78%), schizophrenia (11%), affective disorders (6%) and mixed (4%). Table 1

Table 2. Completeness of death certificates of psychiatric in-patients in North Cheshire 1980–1986 and 1990–1996

Year	Total deaths	Part Ia only completed (%)	Parts Ib and Ic unstated (%)	Part II unstated (%)
1980 period				
1980	229	64 (28)	120 (52)	130 (57)
1981	221	58 (26)	110 (50)	141 (63)
1982	214	59 (28)	108 (50)	138 (64)
1983	187	52 (29)	95 (51)	106 (56)
1984	176	64 (36)	130 (73)	87 (49)
1985	189	63 (33)	139 (74)	89 (47)
1986	177	50 (28)	91 (51)	100 (56)
Total	1356	410 (30)	793 (58)	661 (49)
1990 period				
1990	111	28 (25)	58 (52)	66 (59)
1991	108	36 (33)	58 (54)	74 (70)
1992	78	18 (23)	46 (50)	39 (62)
1993	59	19 (32)	29 (49)	35 (59)
1994	45	14 (31)	21 (47)	29 (64)
1995	30	10 (33)	15 (50)	19 (63)
1996	30	9 (30)	18 (60)	9 (60)
Total	457	134 (29)	245 (53)	271 (59)

shows the annual death rate (% deaths/mean number of hospital beds) and post-mortem examinations for each of the study periods. The annual hospital death rate of 16%, with a mean rate of autopsy at 9.9%, in the 1980s were not significantly different to the 15% death rate and 8.5% autopsy rate in the 1990s.

In both study periods, 5% of all autopsies (1.5% of total hospital deaths) were requested by clinicians, whereas 95% of post-mortems were requested by the coroner's office to establish causes of sudden or unexpected deaths when no medical officer was in a position to sign the death certificate. Three coroner's inquests involving deaths due to unnatural causes were held, one in the 1980s and two during the 1990s. One verdict of suicide and two open verdicts were recorded. Death rate appears to have declined by an average of 1% with hospital retraction, noticeably so since 1994 which may have resulted from the reduction in numbers of elderly beds.

Completeness of death certificates is shown in Table 2. All sections of death certificates were completed in only 16% of cases, while in 50% of all death certificates, whether based on autopsy or not, neither the underlying cause of death nor the associated conditions were stated. Dementia, the recorded clinical diagnosis in 78% of all deceased, was reported in 31% of death certificates and psychiatric diagnoses other than dementia (22% of all deceased) in only 2% of death certificates (Table 4).

Cause of death (1a) in the two study periods is shown in Table 3.

Underlying cause of death (1b and c) was not reported in 793 (58%) and 245 (54%) death certificates issued in the 1980s and 1990s, respectively (Table 2). The recorded underlying causes of death included: cardiovascular cause (22%), malignancy (4%), respiratory failure (6%), renal failure (3%), neurological condition (2%), diabetes (2%) and less than 1% dementia or senility.

Associated conditions at death (part II) were not reported in 661 (49%) and 271 (59%) of all death certificates in the 1980s and 1990s respectively (Table 2). Table 4 shows almost equal proportions of dementia (31 and 29%) and senility (12 and 7%), and only 2% stated the presence of a psychiatric condition at time of death in the two periods. Autopsy-based certificates did not report senility but recorded dementia in only 1 and 5% in the 1980s and 1990s, respectively.

Post-mortem examinations – Tables 1 and 3 show the difference in findings of autopsy during the two periods. Apart from some reduction in the rate of autopsy in the 1990s, there was no significant difference between post-mortem findings and how they differ from the clinically-based death certificates. Autopsy-based death certificates reported fewer cases with bronchopneumonia as direct cause of death compared with those completed by medical staff without autopsy ( $P < 0.001$ ). More findings were also reported with myocardial infarction and other cardiovascular causes ( $P < 0.05$ ) in the autopsy-based certificates. Hypothermia was recorded on three occasions, presumably on patients who

Table 3. Direct cause of death as reported in death certificates with and without autopsy (Part Ia of death certificates)

Direct cause of death	1980-1986			1990-1996		
	n	Post-mortem not performed	Post-mortem performed	n	Post-mortem not performed	Post-mortem performed
Bronchopneumonia (n=951)	728	55%**	13%	223	52%**	15%
Myocardial infarction (n=156)	111	7%**	26%	45	8%**	23%
Malignancy (n=118)	81	6%	4%	37	8%	4%
Cerebral haemorrhage (n=6)	5	-	3%	1	-	2%
Hypothermia (n=4)	2	-	2%	2	-	4%
Cardiovascular (n=421) (not stated as myocardial infarction)	319	24%	18%	102	23%	21%
Respiratory failure (n=40)	28	29*	14%	12	2%	8%
Dementia and senility (n=82)	54	4.5%	-	28	3%	-
Renal failure (n=35)	28	2%	-	7	2%	-
Total (n=1813)	1356	90.1%	9.9%	457	91.5%	8.5%

\* $P<0.05$ ; \*\* $P<0.01$ .

Table 4. Associated conditions that existed at death as reported in death certificates with and without autopsy (Part II of death certificates)

Associated conditions at death	1980-1986		1990-1996	
	Post-mortem not performed, n (%)	Post-mortem performed, n (%)	Post-mortem not performed, n (%)	Post-mortem performed, n (%)
Not stated	618 (51)*	93 (69)	236 (56)*	28 (72)
Medical	52 (4)*	37 (28)	16 (4)*	8 (21)
Psychiatric	23 (2)	1 (0.7)	14 (3)	1 (3)
Dementia	382 (31)**	3 (2)	122 (29)**	2 (5)
Senility	147 (12)	-	30 (7)	-
Total (n=1813)	1222	134	418	39

\* $P<0.05$ ; \*\* $P<0.01$ .

went off wandering in cold weather. One incident of suicide (by asphyxia, using a plastic bag) was recorded in the seven years during the 1980s and two incidents that attracted an open verdict; drowning in the hospital bath and by hanging, had been recorded in autopsy during a similar period in the 1990s. The underlying cause of death was twice as likely to be reported in death certificates based on autopsy as 75% of autopsy-based certificates had the underlying cause of death completed, higher than the 35% in the clinically-based certification ( $P<0.01$ ) for both periods. Table 4 shows that a higher proportion of autopsy-based certificates did not report any associated conditions in part II of the certificates (72%), compared with 53% of the clinically-based certificates ( $P<0.05$ ).

### Comment

The review shows that little has changed in doctors' perceptions of death certificates over

two decades in a large psychiatric hospital. In this study bronchopneumonia was reported as direct cause of death in over 55% of all deaths of psychiatric long-stay patients, which is not dissimilar to around 70% reported by Burns *et al* (1990), Whitehead & Hunt (1982) and Kay (1962). Bronchopneumonia is also the most common mode of death found in elderly medically ill geriatric patients (Burns *et al*, 1990; Macera *et al*, 1992). Kay *et al* (1962) showed that subjects with senile dementia died from non-specific causes such as bronchopneumonia, whereas functionally-ill patients had similar proportions of specific and non-specific deaths compared with the general population. However, in this review bronchopneumonia was significantly less frequently recorded if post-mortem examination was carried out. Cardiovascular conditions were, on the other hand, more frequently reported in autopsy-based certificates.

Ninety-five per cent of all post-mortems were not selective hospital autopsies requested by

clinicians. The main reason for the coroner's requesting autopsy was to establish cause of death which, in all but three, had been due to natural causes. So autopsy-based certification in this study involved a random sample, probably representative of all hospital deaths. Therefore, positive or negative findings of the effect of autopsy on the accuracy of death certificates may apply to all deaths reported from the same population. The randomness of the vast majority of autopsy cases may explain why the percentages have remained so constant over the review periods. Corsellis (1962), in a neuropathological study, found that only 20% of dementia patients died of bronchopneumonia at autopsy, not dissimilar to the 14% found in this review more than 35 years later. The underlying cause of death was twice as likely to have been reported in autopsy-based death certification. The rate of hospital autopsy in this study of only 5% of all post-mortems during the study periods (1.5% of total hospital deaths) is considerably lower than other specialities (Harris *et al*, 1993) and half that of the national average (Ashworth, 1991) and the previously reported autopsy rate in psychiatry of 10% (Newens *et al*, 1993). It may be that autopsies were not considered of great value in long-stay psychiatric patients, the majority of whom had a well-documented medical history.

The contribution of dementia, as a chronic syndrome associated with varying frequency and severity and with many comorbid disorders, to death varies and may be difficult to assess in the individual case. In this review, more than 48% of cases with dementia, present at death, was not recorded as having contributed directly (1b and c) or indirectly (II) to the death. Dementia was recorded as the immediate cause of death in 2%, similar to that previously reported by Newens (1993).

Martyn & Pippard (1988) pointed out that the use of the underlying cause of death as reported in mortality statistics would be an economical way of investigating regional differences in the incidence of dementia. In this study, dementia was recorded in 31% of death certificates compared with 57% reported by Martyn & Pippard (1988) and similarly by Newens *et al* (1993). The review findings clearly show that underlying cause of death is an unreliable source of information concerning the presence of dementia and other psychiatric conditions at death.

## Discussion

Inadequate reporting of cause of death leads to serious inaccuracies. Clinicians should be more aware of the importance of recording dementia on the death certificates. But could more

hospital autopsies add anything to death certificates or improve their accuracy?

Autopsy is likely to have little value in ensuring higher rates of recording conditions such as dementia, particularly Alzheimer's disease, but may be of value in providing more information regarding underlying cause of death in the elderly. The main value of autopsy in psychiatry is to verify the diagnosis of Alzheimer's disease and other dementias, especially as almost half of clinically diagnosed Alzheimer's disease are not confirmed neuropathologically (Molsa *et al*, 1985; Homer *et al*, 1988). But neuropathological examination of the brains may be outside the remit of hospital pathologists carrying out a post-mortem. Even by conforming with Royal Colleges recommended autopsy rates of 35% (Kamal *et al*, 1997), 65% of cases will still depend on the way the doctor completes the death certificates and information that he decides to include, especially chronic conditions such as dementia. Pathologists cannot diagnose the presence of dementia from their autopsy findings alone and recording the diagnosis of dementia rests almost entirely with the clinician. The review has shown that very little has changed in doctors' perceptions of death certification during the 1980s and 1990s. Findings of studies carried out 36 years ago in Sweden (Kay, 1962) and England (Corsellis, 1962) have remained virtually unchanged. The onus is on clinicians to produce adequate death certificates that may provide valid statistical data to be used in estimating prevalence, trends, risk factors and other aspects for future research.

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Emad Salib, Consultant Psychiatrist, Winwick Hospital, Warrington

Correspondence: 16 Carriage Drive, Frodsham, Cheshire WA6 6DX

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