MEDICAL PRACTICE

Contemporary Themes

Trends in hospital necropsy rates: Scotland 1961-74

H M CAMERON, EUPHEMIA McGOOGAN, J CLARKE, BARBARA A WILSON

British Medical Journal, 1977, **1**, 1577-1580

Summary

Examination of mortality statistics for Scottish hospitals showed that from 1961 to 1974 necropsy rates fell by almost 0·6% a year; by 1974, the rate over the whole country was 23% of hospital deaths. The fall resulted from a reduction in the number of necropsies and a coincident rise in the number of deaths in hospital. The necropsy rate fell with increasing age, was rather lower for women than men, and was lower for some diseases than others. There were considerable inaccuracies in the figures from which these trends were drawn, and these were in turn due to inaccurate recording of clinical and necropsy data. Examination of necropsy returns from the Scottish teaching hospital departments showed that, while a similar fall in necropsy rates was seen in some, there was no consistent pattern.

Introduction

Twenty years ago necropsies were performed after most deaths in British hospitals. Often the pathologist was joined by clinical staff, accompanied perhaps by students, for a discussion of the case. This was widely accepted as important to good hospital practice. Recently the necropsy rate (necropsies as a percentage of hospital deaths) has fallen considerably in Britain and overseas,[1-3] and in many centres it is now unusual for senior clinicians to attend.

This prompts many questions, including: Has the necropsy lost some of its former value? Is it being crowded out by other commitments? Is the manner of its performance inappropriate to the changing face of hospital practice? Are changing social attitudes introducing difficulties in obtaining consent from relatives?

We have obtained data on many hospital deaths and necropsies in Scotland, and we present findings that shed some light on current trends in necropsy rates. They have also shown defects in the collection of hospital statistics.

Methods

We used two sources of data. Mortality statistics from the Scottish Hospitals Inpatients Statistics (SHIPS) were supplied by the Information Services Division of the Common Services Agency. All patients who died in any Scottish hospital from 1961 to 1974 were recorded in these returns. From these, necropsy rates were calculated for the whole country and for regional hospital boards (before the reorganisation of the NHS); these were analysed by age, sex, and category of disease. We used three major categories of disease from the International Classification of Diseases (eighth revision): category II—neoplasms (140-239); category VII—diseases of the circulatory system (390-458); and category VIII—diseases of the respiratory system (460-519).

Nevertheless, since the amalgamation in 1967 of "cerebrovascular disorders" (430-438) and "other cardiovascular disorders" (390-429 and 440-458) under the one rubric (category VII) effectively conceals differences between two important distinct groups, we have analysed them separately, thus using *four* categories in all: neoplasia, cerebrovascular diseases, cardiovascular diseases, and respiratory diseases.

The departments of pathology of the Scottish teaching hospitals provided the number of hospital deaths for their major hospital per

Department of Pathology, University of Edinburgh, Edinburgh EH9 9AG
H M CAMERON, MD, FRCPATH, senior lecturer
EUPHEMIA McGOOGAN, MB, CHB, lecturer
BARBARA A WILSON, BSC, research fellow

Information Service Division, Common Services Agency, Edinburgh EH5 3SQ
J CLARKE, MB, DPM, community medicine specialist

year from 1967 to 1975 and the number of necropsies in those hospitals. (This was only a part of their commitments and excluded necropsies carried out for other hospitals and for the Fiscal.) We present only the figures for the first and last years of the survey; this conceals some fluctuations over the years, but accurately reflects the trends.

Results

Necropsy rates from SHIPS

In 1961 there were 25 697 hospital deaths in Scotland, and necropsies were performed on 8012 of these, giving a necropsy rate of 31%; by 1974, hospital deaths had risen to 31 580 and necropsies had fallen to 7378, giving a necropsy rate of 23% (table I). This was an average decline of 0·6% a year—the result of 5883 more hospital deaths and 634 fewer necropsies.

In the five regional hospital boards necropsy rates varied widely; this variation was still evident by 1974, although the rate of fall varied among regions from 0·2 to 1·2% a year (table I; fig 1). The generally low rate in the north region was not surprising in view of the widely dispersed nature of the communities of the Highlands and Islands. The South-east region, which formerly had the highest rate, showed the greatest fall, from 35% to 18% (a rate of fall of 1·2% a year).

TABLE I—*Necropsy rates in Scotland and its Regions*

	Average necropsy rate (%)		Difference %	Rate of decline, % per year
	1961	1974		
Scotland	31	23	8	0·6
Northern region	15	7	8	0·6
North-eastern region	28	25	3	0·2
Eastern region	27	22	5	0·4
South-eastern region	35	18	17	1·2
Western region	31	25	6	0·4

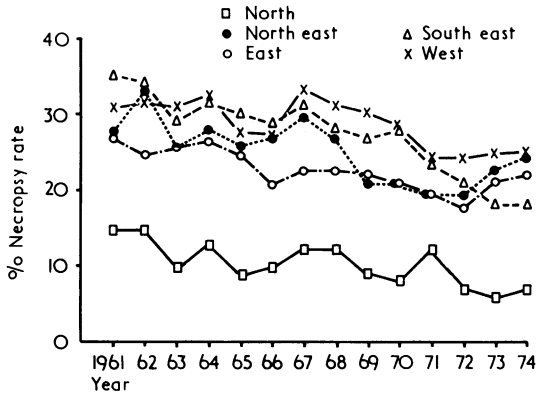

FIG 1—Necropsy rates by regional health boards from 1961 to 1974.

Relation to age—The necropsy rate fell steadily with increasing age (fig 2); an almost parallel decline within each successive decade was seen throughout the survey period. These results were for all Scotland and they can be virtually duplicated by the figures for the various regions and hospitals.

Relation to sex—The necropsy rate for female patients at all ages was consistently about 5% lower than that for males—both for all Scotland (fig 3) and all regions. Admittedly, until 1973 fewer women died in hospital than men (fig 4); nevertheless, the proportion of women who came to necropsy was consistently lower throughout the period (fig 3).

Relation to category of disease—Necropsies are more often carried out in some categories of disease than in others (fig 5). Throughout the period the cerebrovascular disorders group had the lowest necropsy rate; by 1974 it was 14%. The highest necropsy rates in 1974 were for the cardiovascular disorders group (24%), and this was followed by the neoplasia group at 23% and the respiratory disorders group at 19%. If the cerebrovascular disorders group and the cardiovascular disorders group are combined (as in the 8th revision of ICD) this differential is obscured, and the circulatory disorders group (category VII) runs between the neoplasia and respiratory disorders groups (fig 6), as was reported in the survey by Waldron and Vickerstaff.[3] There were some minor local variations in these patterns in the different regions, probably the result of local interests. The generally

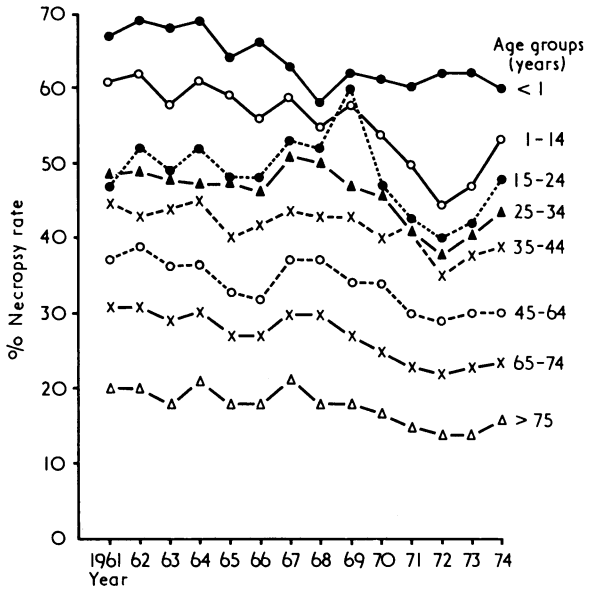

FIG 2—Necropsy rates for Scotland analysed by age group.

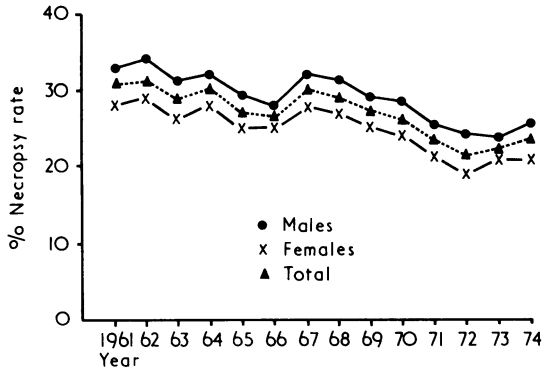

FIG 3—Necropsy rates for Scotland analysed by sex.

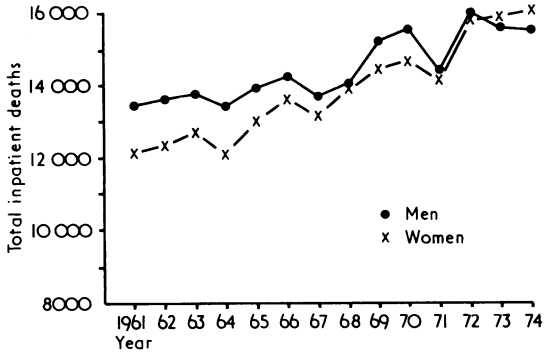

FIG 4—Scotland total inpatient deaths analysed by sex.

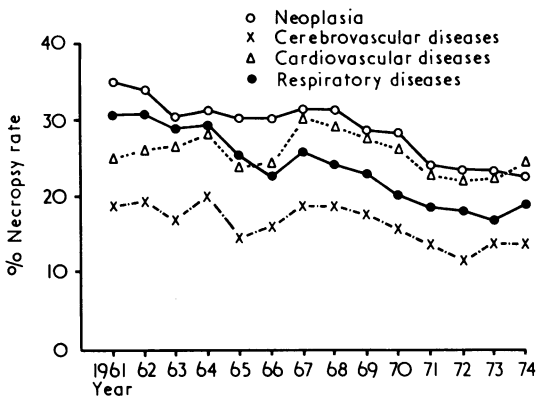

FIG 5—Necropsy rates for Scotland analysed by disease category, 1961-74.

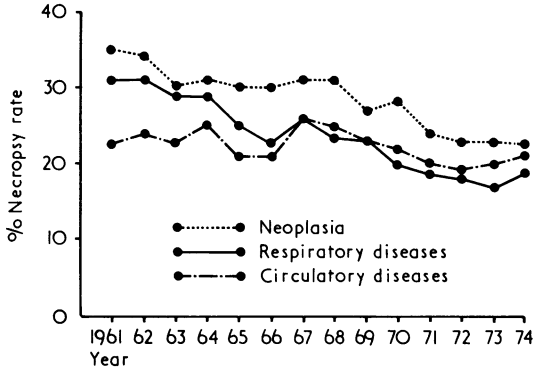

FIG 6—Necropsy rates for Scotland analysed by disease category, 1961-74 to show the new category VII—circulatory disorders.

low rate of necropsies in cerebrovascular disorders was no doubt partly related to the low rate in older patients.

Necropsy rates from pathology departments of Scottish teaching hospitals

Figures from the pathology departments of the teaching hospitals showed considerable variations (table II). In Aberdeen Royal Infirmary both the number of hospital deaths and the necropsy rate stayed constant over nine years (1967-75). In Glasgow Royal Infirmary the necropsy rate fell considerably, but this was largely accounted for by more hospital deaths; the absolute number of necropsies showed only a small fall from 462 to 430 (7%). In Edinburgh Royal Infirmary there has been a similar rise in the number of hospital deaths, but the fall in the absolute number of necropsies from 659 to 480 (27%) is greater. For comparison, in the Western General Hospital, Edinburgh, the falling rate was attributable mainly to the increased number of hospital deaths, the actual number of necropsies being relatively unchanged (table II). The returns from Glasgow Western Infirmary and from Dundee were difficult to interpret because of the opening of new hospitals, but both showed relatively high necropsy rates, and in Glasgow (Western Infirmary and Gartnavel General Hospital) this has been achieved despite a notable increase in the number of hospital deaths. The high necropsy rates in these new hospitals contrasted with the already low and still declining rates in some longer established hospitals.

TABLE II—*Necropsy rates in pathology departments of Scottish teaching hospitals*

	Hospital deaths	No of necropsies and rate (%)
Aberdeen Royal Infirmary		
1967	827	346 (41·8)
1975	837	356 (42·5)
Glasgow Royal Infirmary		
1967	1038	462 (44·5)
1975	1457	430 (29·5)
Edinburgh Royal Infirmary		
1967	1228	659 (53·6)
1975	1541	480 (31·1)
Edinburgh Western General Hospital		
1967	485	234 (48·2)
1975	685	256 (37·3)
Glasgow Western Infirmary		
1967	961	489 (50·9)
Glasgow Western and Gartnavel General Hospital		
1975	1491	652 (43·8)
Dundee Royal Infirmary, Maryfield, and others		
1968	1391	581 (41·8)
Ninewells and Dundee Royal Infirmary		
1975	1029	416 (40·4)

Discussion

NECROPSY RATES

Our figures showed a steady decline in necropsy rates in Scotland from 1961 to 1974. This was seen both in the Highlands and Islands, where the scattered nature of the community presented particular problems, and in the populous regions with more advanced facilities. In 1974 the rate for the whole country was 23%, and the average decline was about 0·6% a year. These figures were derived from data recorded in SHIPS, which in turn are compiled from the forms "Scottish Medical Record 1" (SMR1) submitted by the hospitals. Deficiencies in recording hospital findings have been described recently from Glasgow.[4-6] Experience indicates that there are many inaccuracies in most official returns, and no study of mortality statistics should be regarded as valid unless it includes a critical scrutiny of the source data. The inaccuracies in the present investigation were no doubt introduced at several points.

We found that one major source of error was in completing the form SMR1. One item recorded on this was whether necropsy was carried out or not. One might imagine that the recording of such a simple fact would be reliable, but in our experience of a small sample in the Royal Infirmary, Edinburgh, this was by no means so.[7] We cannot say how general this is, but examination of data from Aberdeen showed that this information was correctly recorded in more than 90% of cases. Necropsy rates there (North-east region—fig 1) run more or less parallel to those in the other regions. Probably, therefore, the following broad trends, despite inaccuracies, were real: (*a*) there was a downward trend in necropsy rates throughout the country; (*b*) men were more often examined than women; (*c*) the necropsy rate fell steadily with increasing age; and (*d*) the clinical diagnosis was an important determinant, necropsies being more often performed on patients with some clinical diagnoses than others. This may be related to age—for example, in determining the low rate in cerebrovascular disorders.

All these trends were found consistently in the separate regions and were in broad agreement with those in a similar survey in Birmingham.[3] In the United States, where falling necropsy rates have also been noted,[1 2] there was a similar tendency for necropsies to be less often carried out on women and on the elderly.[8 9]

We tried to show whether the major downward trend was also seen in the larger teaching departments of pathology (table II): there was in fact no constant pattern. Some teaching departments were doing as many necropsies as before, but they may have showed a lowered percentage because of the increased numbers of patients dying in hospital—that is, necropsy *rates* do not necessarily reflect necropsy *numbers*. Two departments—the Royal Infirmaries in Glasgow and Edinburgh—showed quite different trends, but the net result in 1975 was that both were doing necropsies on similar proportions of hospital deaths.

Value of necropsy findings—The data in SHIPS are used in studies of hospital epidemiology and service needs. It is important

that objective necropsy findings should be used to increase the accuracy both of clinical case notes and case abstracts. Recording errors in the SHIPS scheme should also be eliminated. We are carrying out a prospective investigation of this; preliminary findings show that in many cases necropsy findings have made no impact on the recorded diagnoses, even when there have been gross discrepancies.[7] Thus errors are fossilised in the permanent record.

Selection of cases for necropsy—Necropsies are expensive and time-consuming, and it may be asked whether the most appropriate cases are being selected for examination. There is no doubt that there already is an element of selection—as shown by our national figures and from one's personal experiences of hospital practice. Clinicians vary greatly in their attitudes to the necropsy room; their convictions about the value of necropsies in clinical practice, teaching, and research; their confidence in clinical diagnoses; and their approach to relatives. We have inquired into this by questionnaire and the responses will be reported.

We are grateful to our colleagues in the departments of pathology of the Scottish medical schools for providing data.

This study was supported by a grant from the Scottish Home and Health Department to A R Currie and H M Cameron.

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(*Accepted 18 March 1977*)

The ultimate audit

GILLIAN GAU

British Medical Journal, 1977, **1**, 1580-1582

Summary

The necropsy diagnoses in 78 stillborn and young infants have been compared with the clinical diagnoses in an attempt to justify post-mortem examination in this age group. Clinical diagnosis was confirmed in over 88% of cases but unexpected changes in diagnosis were made in six cases, which indicates that selection is of no value.

Introduction

The role of the necropsy in medicine is one that may cause extreme views even among morbid anatomists. The case for a 100% necropsy rate is justified by the argument that the clinician, supported or confounded by the findings, will modify future treatment accordingly and hence improve clinical care.[1] Against that a plea for greater selection of cases is made because necropsy is a time-consuming procedure that rarely modifies the clinical diagnosis.[2]

The subject of post-mortem examination of the stillborn and young infant has not promoted much written opinion, but it is a highly emotive topic in discussion. The problem of requesting permission for a necropsy falls heavily on junior medical staff, whose experience in this field may be limited and who may well feel inadequate to cope with it.[3] This is difficult in the case of an adult death but how much harder to approach a young couple, with whom the doctor may well identify, who only hours earlier were anticipating a happy outcome to months of planning a new way of life. Facts are needed to justify such an assault on both patient and doctor. The following findings may help the decision of whether or not to request a necropsy and if so with or without case selection.

Department of Morbid Anatomy, Wycombe General Hospital, High Wycombe, Bucks

GILLIAN GAU, MB, BS, registrar (present appointment: lecturer morbid anatomy, Bernhard Baron Memorial Research Laboratories, Queen Charlotte's Maternity Hospital, London W6 0XG)

Methods

Seventy-eight necropsies were performed on 43 stillbirths and 35 live-born infants in a district general hospital. All were over 28 weeks' gestational age. Duration of life ranged from a gasp to three weeks with only eight surviving over 48 hours.

All necropsies were performed by one person, thereby reducing technical variation, and took place over three years. Permission to perform a necropsy was requested routinely by obstetric or paediatric staff and, when obtained, necropsy was usually carried out within 36 hours of death, or of delivery in the case of stillborn infants.

All systems were examined, as was the placenta when it was presented. Tissues were subjected to histological examination. Pulmonary bacteriology was obtainable in most cases. Genetic analysis was requested only when the stigmata deemed it promising. A second opinion was sought with problem cases. The clinical notes were studied before necropsy and the staff were asked to give the most likely clinical diagnosis.

Results

Results are expressed by the clinical diagnosis and whether or not the necropsy diagnosis agreed with it. Additional information obtained is also detailed (table I).

In 59 out of 78 cases (75·6%) necropsy diagnosis completely agreed with the clinical diagnosis. In another 10 cases additional information was obtained (88·5%). In the other nine cases (11·5%) the necropsy diagnosis was radically different from the clinical diagnosis (table II).

Discussion

That as high a proportion as 88·5% of diagnoses was largely confirmed may well indicate that necropsy should be undertaken