ORIGINAL ARTICLE

Necropsy practice after the "organ retention scandal": requests, performance, and tissue retention

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J Clin Pathol 2003;**56**:537–541

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Accepted for publication 19 January 2002

Aims: After the so called "organ retention scandal" in the UK this study set out to assess the impact on death certification and hospital (consent) necropsies, including the postmortem retention of tissues and organs.

Methods: Data were prospectively gathered over a one year period for all deaths occurring at the Royal Hallamshire Hospital, Sheffield, UK to determine the frequencies with which death certificates were completed and necropsies were requested. The seniority of the clinician undertaking these duties was recorded. Pathologists were asked to record the extent of every necropsy during the study period. The type and planned uses of tissues retained were recorded.

Results: Death certificates were issued for 88.5% of the 966 deaths for which clinicians completed proformas. Of these, 88.9% were issued by preregistration and senior house officers. Consent was sought for a necropsy in 6.2% of cases (usually by non-consultant staff) and was granted in 43.4% of these. The overall, medicolegal, and hospital necropsy rates were 13.4%, 9.9%, and 3.5%, respectively. Tissues were retained from 55.4% of necropsies for diagnostic purposes, although sampling does not appear to be systematic.

Conclusions: Death certification and seeking consent for a necropsy are frequently delegated to junior clinical staff. This may explain the low standard of death certification reported by others and the low necropsy rate. The decline in the necropsy rate and the low rate of sampling for histological examination highlight the decline of the hospital necropsy and the lack of a systematic approach to tissue sampling.

That the necropsy is a valuable procedure in modern clinical practice[1–7] and medical education[8–16] has been repeatedly and well established. Nonetheless, previous studies have indicated the gradual but persistent decline in the necropsy rate both in the UK[17 18] and in the USA.[19]

Necropsies have never been under as much scrutiny from the public, the media, the government, and the medical profession. In 1991, guidelines were published to assist those involved in seeking consent for non-medicolegal necropsies.[20] In addition, the Royal College of Pathologists (UK) set out recommendations for the extent of postmortem examinations, including an indication of the nature and minimum number of tissue samples to be retained for histopathological evaluation.[21] (More detailed guidelines on necropsy practice were published by the Royal College of Pathologists after our study was completed[22].) The inquiry into paediatric necropsy practices at the Royal Liverpool Children's Hospital (Redfern report[23]) and the associated media coverage of these events have damaged the public confidence in, and the reputation of, postmortem pathologists.[24]

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In May 2001, we set out to determine prospectively the nature of necropsy practice in our hospital. In particular, we wished to determine who was issuing death certificates, the frequency of requests for hospital (consent) necropsies, the frequency with which such requests were granted, and who was asking (and being asked) for consent. In addition, we wished to know the frequency with which complete, limited, and needle necropsies were performed, the reasons for limiting necropsies, the frequency with which tissues and organs were retained at necropsy, and the reasons for such retention.

METHODS

Our study took place between May 2001 and April 2002 at the Royal Hallamshire Hospital, Sheffield, UK. This is a major 850 bed teaching hospital with busy surgical and medical units. In addition, the mortuary undertakes necropsies on patients dying at the local oncology hospital and the local women's hospital as required.

Determining the death rate and necropsy rates

The mortuary records for the Royal Hallamshire Hospital from 1979 to 2001 were examined to determine the number of bodies received by the mortuary each year, the number of necropsies performed each year, and the proportion of these that were performed for the coroner. The overall necropsy rate was defined as the total number of necropsies divided by the total number of deaths. The coronial necropsy rate was defined as the number of coronial necropsies divided by the total number of deaths. The hospital necropsy rate was defined as the number of clinical necropsies divided by the total number of deaths.[17]

Clinicians' practices of death certification, coronial referral, and requests for hospital necropsies

Doctors called to issue a Medical Certificate of the Cause of Death were asked to complete a one page proforma for our study, regardless of whether a death certificate could be issued. The form requested the name and unit number of the patient (for cross referencing with mortuary records) and the specialty of the firm caring for the patient at the time of death. The form then asked the clinician to indicate whether a death certificate had been issued. Doctors issuing a certificate were

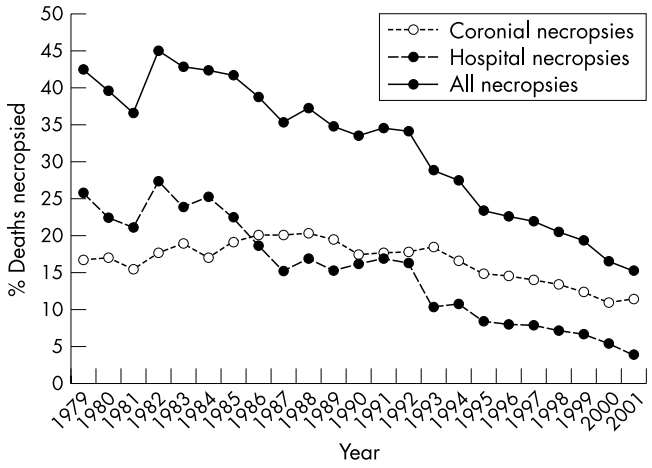

Figure 1 Overall necropsy rates (solid line) have steadily declined since 1979. This decline mirrors the decline in the hospital necropsy rate (dashed line). The coronial necropsy rate (dotted line) has largely remained constant. The data refer to necropsy rates at the Royal Hallamshire Hospital, Sheffield, UK.

asked to indicate their seniority, and whether a hospital (consent) necropsy had been requested. The consent form was that recommended by the Royal College of Pathologists (March 2000). If such a necropsy had been requested, the doctor was asked to indicate who had sought consent, from whom, and whether consent had been granted. Finally, the doctor was asked to indicate for all deaths whether the death had been discussed with the coroner's office and whether that office had accepted that death for further investigation.

Necropsy data

Pathologists performing necropsies in the Royal Hallamshire Hospital mortuary were asked to complete a proforma for every necropsy performed, regardless of whether it was performed for medicolegal reasons and regardless of the type of necropsy undertaken. This proforma requested the name and unit number of the deceased, and the postmortem accession number (to allow complete records to be obtained and cross referenced with the clinicians' proformas). The pathologist was then asked to indicate whether a complete necropsy had been performed. For the purpose of our study, a complete necropsy consisted of evisceration of the cranial, thoracic, abdominal, and pelvic cavities, and macroscopic examination of the internal organs, with or without sampling for histological assessment. For limited necropsies, the pathologist was asked to indicate the limiting factor(s), the nature of the limitation (in terms of organ systems/body cavities examined, and whether or not a "needle" necropsy was undertaken). The pathologist was asked to indicate their seniority and whether they had been approved by the local coroner to undertake medicolegal necropsies. Finally, pathologists were asked to indicate what, if any, tissue samples and/or whole organs had been retained for the purposes of clinical diagnosis, research, and teaching.

RESULTS

Figure 1 summarises the necropsy rate and the rates of medicolegal and hospital consent necropsies between 1979 and 2001.

Death certification, requests for necropsy, and discussions with the coroner

During the study period the mortuary received 1039 bodies. These led to 139 necropsies, of which 103 (74.1%) were undertaken for the coroner and 36 (25.9%) were undertaken with the consent of relatives or next of kin. Thus, the overall necropsy rate during the study period was 13.4%, with a coronial necropsy rate of 9.9%, and a hospital necropsy rate of 3.5%.

Clinicians completed proformas for 966 deaths (93.0%). Table 1 lists the frequency of deaths by clinical specialty. A death certificate was issued in 855 (88.5%) of cases. Table 2 shows the frequency of death certificates issued according to seniority of the clinician. A consent necropsy was requested for 53 (6.2%) elligible deaths for which proformas were received. The certifying doctor made the request in 77.4% of these cases (table 3). Consent was most frequently sought from the spouse of the deceased (30.2 %), their son or daughter (26.4%), a sibling (7.6 %), or a combination of relatives (17.0%). The person from whom consent was sought was unspecified in 10 (18.9 %) cases. Consent for a necropsy was obtained in 23 (43.4%) cases. A total of 405 (39.0%) deaths were discussed with the coroner's office, of which 111 (27.4%) were accepted for further investigation.

Table 1 The distribution of deaths according to the specialty of the firm caring for the patient at the time of death

Specialty	N	%
Anaesthetics*	4	0.4
Cardiology†	74	7.7
Care of the elderly	138	14.3
Diabetology	2	0.2
Gastroenterology/hepatology	36	3.7
General medicine	254	26.3
Haematology	58	6.0
Infectious diseases	28	2.9
Neurology‡	29	3.0
Respiratory medicine	80	8.3
Rheumatology	3	0.3
Ear, nose, and throat§	13	1.4
Gastrointestinal surgery	15	1.5
General surgery	112	11.6
Neurosurgery	49	5.1
Obstetrics and gynaecology	15	1.5
Unknown	9	0.9
TOTAL	966	100

*Includes intensive care unit; †includes coronary care unit; ‡includes neuromedicine and the stroke unit; §includes oral and maxillofacial surgery.

Necropsy practice

Completed proformas were received for 139 necropsies (100%). These related to 103 coronial necropsies and 36 hospital necropsies. A complete necropsy was performed in 119 cases (85.6%). Necropsies were limited only at the relatives' request (16 cases) or because of danger of infection (four cases). In all cases limited because of a danger of infection, the deceased was suspected to have a transmissible spongiform encephalopathy, and the necropsy was limited to

Table 2 The frequency with which different clinicians issued death certificates

Seniority of clinician	N
Preregistration house officer	464
Senior house officer	296
Specialist registrar	47
Staff grade	11
Consultant	18
General practitioner	11
Unspecified	8

Most certificates are issued by preregistration house officers (54.3%) and senior house officers (34.6%).

Table 3 The frequency with which different clinicians requested hospital necropsies

Seniority of clinician	Number of requests made for a hospital necropsy	Number of cases in which consent was obtained
Preregistration house officer	13	5
Senior house officer	23	14
Specialist registrar	9	3
Staff grade	0	0
Consultant	4	1
General practitioner	0	0
Nurse	0	0
Bereavement officer	0	0
Unspecified	4	0

Most requests are made by senior house officers (44.4%) and preregistration house officers (24.5%).

Table 4 The frequency with which parts of the body are examined during necropsies limited at the request of the deceased's relatives (n=16)

Postmortem examination limited to	N
Brain	7
Chest and abdomen	4
Abdomen	2
Chest and brain	1
Chest	1
Unspecified	1

examination of the brain. Table 4 summarises the sites necropsied in cases limited at the request of the relatives. No needle necropsies were performed. Of the 139 necropsies performed, 16 (11.5%) were performed by senior house officers, 39 (28.1%) by specialist registrars, and 84 (60.4%) by consultant histopathologists. Most of the necropsies (124; 89.2%) were performed by pathologists approved by the local coroner to undertake medicolegal necropsies. Tissues were retained for histological study in 77 (55.4%) necropsies for the purpose of refining or confirming the macroscopic diagnosis. Such material was retained from 52 coronial cases (50.5%) and from 25 hospital necropsies (69.4%) The only whole organ retained was the brain (and or spinal cord), retained in 14 (10.1%) cases. Table 5 illustrates the frequency with which organs were sampled for histology. Samples of tissue (thyroid, pituitary, kidney, liver, and brain) were retained from one necropsy for educational purposes. The brain (with or without spinal cord) was retained (with consent) primarily for research purposes in six (4.3%) necropsies.

Table 5 The frequency with which tissues were sampled for histology from 139 necropsies

Organ sampled	N
Lung	32
Heart	24
Liver	16
Kidney	10
Tumour	9
Brain	8
Bone	8
Spleen	6
Lymph node	6
Pleura	6
Pancreas	5
Lower gut	4
Thyroid	4
Prostate	3
Upper gut	3
Bladder	2
Cervix	2
Peritoneum	1
Mesentary	1
Pericardium	1
Adrenal	1

The figures do not include the retention of whole organs.

DISCUSSION

The necropsy rate declined dramatically during the last part of the 20th century.[17 18] Our study confirms that this trend has continued. Moreover, we have demonstrated that, in our hospital, this decline has resulted almost entirely from the decline (from 25.8% in 1979 to 3.9% in 2001) in the number of hospital necropsies. In addition, the coronial necropsy rate has fallen by a third during that time (from 16.8% in 1979 to 11.4% in 2001).

In the past, clinicians have explained the deline in the hospital necropsy rate by the fact that relatives do not want them.[25 26] However, from our study it appears that the hospital necropsy rate is so low because clinicians do not request them. A consent necropsy was requested in only 6.2% of eligible cases. When sought, consent was obtained in 43.4% of cases. We deliberately did not investigate why clinicians seek consent (and why not) because we were concerned that such questioning could bias their practice towards seeking consent (the Hawthorn effect). Thus, our work supports that of others who have found that hospital necropsy rates can be raised to approximately 50% (or even higher) if concerted efforts are made to request them.[27 28] We should emphasise, however, that a higher necropsy rate may not automatically lead to improved clinical practice unless the data are used in systematic audit.[29]

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Previous studies have suggested that most death certificates are completed by either junior doctors or administrators.[18] In their recent study, Swift and West[30] highlighted the fact that death certificates are frequently completed to a poor standard. They found that only 55% of certificates were completed to a minimally acceptable standard. Details of seniority were not collected. Given the findings of our study, it is interesting to note that both the Broderick report[31] and a joint report of the Royal College of Physicians and the Royal College of Pathologists[32] recommend that death certification should be the duty of a senior member of the clinical team. The Broderick report notes " . . .the accuracy of the certification of death in hospitals could be improved if the certification were not completed . . . by the least experienced member of the hospital staff . . .".[31] The notes that accompany death certificates reiterate this recommendation and state that this duty should not be delegated to juniors unless they are closely supervised.[33] It is perhaps alarming (but not necessarily surprising) that we found in our study that 88.9% of death certificates were completed by preregistration or senior house officers. We did not set out to determine the accuracy of the certificates issued in our study because this has been repeatedly investigated by others.[30]

In 1991, the joint working party of the Royal College of Pathologists, the Royal College of Physicians of London, and the Royal College of Surgeons of England noted that the responsibility for obtaining consent for a non-medicolegal necropsy "lies with the consultant in charge of the case".[20] In 2000, this advice was reiterated by the Royal College of Pathologists, which stated that "(a) senior and properly

trained doctor, preferably a consultant, who knew the relatives best during the patient's last illness should obtain agreement to the postmortem examination".[34] Despite this, we noted that consent for necropsy was sought by either the preregistration house officer or senior house officer in 68.9% of cases. By contrast, only four (7.6%) requests were made by consultant staff. Gibson and colleagues[35] similarly noted that 75% of requests for non-coronial necropsies were made by non-consultant staff (although their non-coronial necropsy rate of 20.2% is considerably higher than the 3.5% noted in our study).

Fewer coronial necropsies (n = 03) were undertaken than the number deaths where no certificate was issued (n = 11) according to the data returned on the clinicians' proformas. This discrepancy may be attributed to several factors. First, medicolegal necropsies performed on patients dying postoperatively or in cases of alleged medical negligence are undertaken at the public mortuary at the Medico-Legal Centre in Sheffield and therefore do not appear in the hospital mortuary's postmortem register. In addition, the discrepancy could reflect the subsequent completion of a death certificate by a general practitioner (unknown to the clinician completing the proforma), rendering an necropsy unnecessary. The discrepancy between the number of hospital necropsies consented and performed probably reflects the incomplete return rate of the clinical proformas. In addition, necropsies are performed in our mortuary on bodies transferred from other hospitals. These necropsies appear in the data from the pathologists but would not appear in the data from the clinicians.

Few limited necropsies were performed. This is not surprising given the low frequency of consent necropsies. The most common reason was refusal (by the relatives) of consent to remove and examine the brain.

Most of the necropsies performed in our study were undertaken by consultant histopathologists (only 16 were undertaken by senior house officers, and 39 by specialist registrars). Rather than reflecting the preponderance of coronial cases, this distribution of the workload probably reflects the fact that, in Sheffield, trainee histopathologists are seconded to the Medico-Legal Centre (Watery Street, Sheffield), where they perform coronial necropsies under the supervision of a Home Office Pathologist.

Many necropsy practitioners would regard a necropsy as incomplete if the macroscopic examination were not confirmed by a histopathological evaluation of the organs and any lesional tissue. Clear guidance as to what constitutes minimum acceptable sampling is lacking for adult necropsies (although the Royal College of Pathologists recommends that in cases of maternal deaths, of which there were none in our study, at least one block of all the major organs including the placenta and membranes should be taken[21]). Our study shows that tissue is not routinely or systematically being sampled for histopathological investigation. The organs most commonly sampled are the lungs, heart, liver, and kidney. That tissue was retained only in 55.4% of necropsies may reflect reluctance to retain tissues in light of the public and media reaction to the events at the Royal Liverpool Children's Hospital,[24] a belief that necropsy histology is unnecessary and/or not cost-effective, or a lack of time to deal with postmortem histology given the pressures of the surgical pathology workload at a time when the profession is greatly understaffed. Sampling exclusively for teaching or research was rare.

> "Our study shows that tissue is not routinely or systematically being sampled for histopathological investigation"

We conclude that necropsy rates have continued to decline since 1993. It is too early to tell whether the recent "organ retention scandal" has had a negative impact on the postmortem rate. In our institution, we note that the decline in the necropsy following the publication of the Redfern report is in line with the declining trend seen in the previous decade. Moreover, published guidelines for the completion of death certificates and seeking of consent for non-medicolegal necropsies are frequently not followed, with many of these activities being undertaken by junior medical staff. If the poor quality of death certification[30] and the declining necropsy rate are to be reversed, these issues need to be dealt with. However, given that sampling of tissues for subsequent histopathological study is uncommon and frequently unsystematic, pathologists must also consider the need to perform necropsies to a consistent standard to ensure that they are as informative as possible and amenable to review and audit.

Take home messsages

- Consent for a hospital necropsy was sought in only 6.2% of cases (usually by non-consultant staff) and was granted in 43.4% of these
- The decline in the necropsy rate and the low rate of sampling for histological examination highlight the decline of the hospital necropsy and the lack of a systematic approach to tissue sampling
- Published guidelines for the completion of death certificates and the seeking of consent for non-medicolegal necropsies are frequently not followed, with many of these activities being undertaken by junior medical staff
- If the declining necropsy rate is to be reversed, these issues need to be dealt with

ACKNOWLEDGEMENTS

The authors thank Mrs P Cross and Mrs M Baxter for their assistance in encouraging clinical staff to complete study proformas when called to issue death certificates.

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