# The decline of the hospital autopsy: a safety and quality issue for healthcare in Australia

The Royal College of Pathologists of Australasia Autopsy Working Party


## ABSTRACT

- Even with new diagnostic modalities, autopsy remains an important tool for quality and safety assurance. A systematic review of reports from 1996 to 2002 found autopsies detected, on average, 23.5% of clinically missed diagnoses involving the principal or underlying cause of death, and 9% of errors that would or could have affected the patient's outcome.
- We surveyed pathology laboratories and hospital administrators across Australia, and found a decline in the hospital autopsy rate from 21% (210/1000 deaths) in 1992–93 to 12% (118/1000 deaths) in 2002–03.
- This decrease is in adult autopsies (66% of all autopsies in 1992–93; 39% in 2002–03). Perinatal autopsies increased from 29% to 58% of all autopsies in this period, mainly due to more examinations of fetuses less than 20 weeks' gestation.
- Factors contributing to this decline may include community attitudes, clinicians' reluctance to request autopsy (partly because of administrative burdens in making the request), hospital concern about legal action if a misdiagnosis is detected, and funding priorities.
- Reversing this decline will require cooperative action at several levels of the healthcare system, and from government bodies.


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THE PROGRESSIVE DECLINE in recent times in the number of hospital autopsies in Australia[1] and overseas[2-4] has concerned many in the medical community and in the wider healthcare system. Previous studies have repeatedly and consistently revealed substantial inaccuracies in clinical diagnoses uncovered by autopsy findings.[5-7] Even with the numerous advances in clinical diagnostic modalities, autopsies continue to demonstrate diagnostic errors that can affect clinical outcomes, yet the decline continues.

In 1993, the Royal College of Pathologists of Australasia (RCPA) published a position statement on autopsy,[8] which reasserted the value and relevance of autopsies to modern medical practice, outlined the essentials of good practice, and proposed parameters for obtaining consent for performing an autopsy and for the use of tissues removed at autopsies.

There are two schools of thought on the value of hospital autopsies. The first, to which the RCPA subscribes, considers autopsy a vital tool for advancing medicine, ensuring safety and quality in the healthcare system, and providing advice and information to the next of kin about causes of death and their implications for families.[8,9] The second view holds that, with the advances in diagnostic modalities now available, the hospital autopsy is redundant, providing minimal additional information at a high cost.[10] This view is at odds with the international literature.[6,11]

We review the recent literature on the value of autopsies and present the findings of a survey of current autopsy practice by Australian hospital departments of pathology and of the views of both pathologists and medical administrators into the importance and use of the autopsy to current medical practice.

## The value of autopsies

The Autopsy Policy of the RCPA, updated in 2002,[9] sets out the importance and benefits of the autopsy for the practice of medicine and the health of the community today. Key roles are:

- improving safety and quality in diagnosis and treatment;
- providing benefits to families;
- advancing understanding of disease; and
- educating medical and allied health professionals.

### *Safety and quality in diagnosis and treatment*

Among the most important contributions of autopsies to the quality of healthcare is ensuring that disease is being diagnosed accurately and treated appropriately. A recent systematic review of changes in rates of diagnostic errors detected at autopsy found that:


**Members of the Autopsy Working Party**

**South Western Area Pathology Service, Liverpool BC, NSW.**
**David J Davies,** MB ChB, MD, FRCPA, Director.
**Royal College of Pathologists of Australasia, Surry Hills, NSW.**
**Debra J Graves,** MB BS, MHA, FRACMA, Chief Executive Officer.
**Department of Anatomical Pathology, Royal Melbourne Hospital, Parkville, VIC.**
**Anthony J Landgren,** FRCPA, FACLM, MRACMA, Barrister and Solicitor.
**State Wide Forensic Medical Services, Royal Hobart Hospital, Hobart, TAS.**
**Chris H Lawrence,** MB BS, BSc(Physiology), FRCPA, Director.
**Department of Histopathology, Women's and Children's Hospital, North Adelaide, SA.**
**Jill Lipsett,** MB BS, PhD, FRCPA.
**Department of Anatomical Pathology, Austin and Repatriation Medical Centre, Heidelberg, VIC.**
**Duncan P MacGregor,** MB BS, PhD, FRCPA, Director.
**Pathology Associates Ltd, Tauranga, New Zealand.**
**Martin D Sage,** PhD, FRCPA, DipForensPathol, Consultant Forensic Pathologist.
Reprints will not be available from the authors. Correspondence: Royal College of Pathologists of Australasia, Durham Hall, 207 Albion Street, Surry Hills, NSW 2021. rcpa@rcpa.edu.au

> of 53 autopsy series identified, 42 reported major errors and 37 reported class 1 errors. Twenty-six autopsy series reported both major and class 1 error rates. The median error rate was 23.5% (range, 4.1%–49.8%) for major errors and 9.0% (range, 0–20.7%) for class 1 errors.[11]

Major errors were defined as "clinically missed diagnoses involving a principal underlying disease or primary cause of death" and class 1 errors as "major errors that, had they been detected during life, 'would', 'could', 'possibly' or 'might' have affected the patient's prognosis or outcome (at a minimum, discharge from the hospital alive)".[11] Over the past decade, adjusted rates had decreased for major errors by 19.4% and class 1 errors by 33.4%, but the absolute number remained high. The authors concluded:

> The possibility that a given autopsy will reveal important unsuspected diagnosis has decreased over time, but remains sufficiently high that encouraging ongoing use of the autopsy appears warranted.[11]

In the context of HIV autopsies, Duflou and Marriott[12] described the effect of clinicopathological conferences on the rate of autopsy discrepancies. These conferences were conducted to improve antemortem diagnosis and treatment, and, after 83 conferences involving 103 HIV autopsies, the rate of major, life-threatening diagnostic discrepancies decreased from 46% in 1991 to 38% in 1994.[12] Discrepancies having potential to affect the patient's wellbeing, although not life-threatening, decreased from 36% in 1991 to 23% in 1994.[12]

The role of autopsy in improving accuracy of diagnosis is often demonstrated by differences between autopsy findings and the cause of death listed on the medical certificate. A recent study in a tertiary referral centre found substantial discordance, although the accuracy varied among organ systems affected and with the nature of the disease.[6] Overall, there was 47% concordance between the death certificate and the autopsy findings.

#### *Benefits to the family*

By providing a clearer understanding of the nature and cause of the illness, the results of autopsy may assist in the grieving process by reassuring family members that action or inaction by them did not contribute to the death. In some instances, direct benefits will include the disclosure of genetic disease, such as haemochromatosis[10,13] and medium-chain acyl-CoA dehydrogenase deficiency.[14]

Autopsies can also detect communicable infectious disease that could affect other family members; for example, 5.1% of all tuberculosis in the United States between 1985 and 1988 was only recognised at autopsy.[15]

#### *Advancing the scientific understanding of disease*

The traditional role of the autopsy in research remains important. Research with human tissue is of two types.

The first type of research uses standard methods to identify and fully characterise emerging diseases. An important recent example has been the recognition of variant Creutzfeldt–Jakob disease.[16-18] Examples from Australian paediatric pathology include the delineation of Reye's syndrome and amoebic meningoencephalitis.[19-21]

Another example is the autopsy studies of the prevalence of alcohol-related neurological disorders. These showed that Australia had the highest world incidence of Wernicke–Korsakoff syndrome caused by thiamine deficiency. This led to mandatory thiamine supplementation of bread flour in all states in 1991. This measure was then validated by a follow-up autopsy study in 1997, which showed a reduction in the prevalence of Wernicke–Korsakoff syndrome.[22]

The second type of human tissue research uses emerging technologies in association with standard methods to improve our understanding of recognised disease. One example is the use of recombinant DNA methods to improve our understanding of different types of bowel cancer.[23,24] Although much of this work could be done with tissue resected during life, the autopsy is the principal source of brain tissue for molecular research into neurodegenerative disorders such as Parkinson's disease.[25,26] An important resource for neuroscience research, including research of this type, has been the development of brain banking for neuroscience research.[27-29] It is of some significance that the public attitude to brain donation for research seems to be different from public perception of other tissue donation, possibly because donors are better informed.[30]

Irrespective of whether an autopsy is coronial or non-coronial, all research on human tissue obtained at autopsy must now be done with informed consent, either of the patient while alive or of the next of kin. Approval from an institutional medical research ethics committee is also required. Further, consent must be explicit both for autopsy and for each specific purpose for which any tissue is used. Such research must comply with the National Health and Medical Research Council (NHMRC) Statement on Human Experimentation and, in NSW, with recently enacted amendments to the *Human Tissue Act 1983*, which remove the waiver for consent that could otherwise be granted in some cases under the terms of the NHMRC statement.

#### *Education*

Until recently, autopsies have made a major contribution to the education of medical students and allied health professionals. A recent article draws attention to the decline in the availability of autopsy experience for medical education and its likely adverse consequences.[31]

### Why is the autopsy rate declining?

It is unlikely that there is a single simple explanation for the declining autopsy rate. In the wake of well-publicised events such as the unauthorised organ retention in the United Kingdom, notably at Alder Hey hospital,[32] and, in Australia, controversy over autopsy practices at the NSW Institute of Forensic Pathology,[33] it is tempting to ascribe this decline to adverse public perception of the autopsy. This was thought responsible for a reduction in autopsy rates reported by Prince Charles Hospital in Brisbane,[34]

## 1: Survey on rates of and attitudes to autopsy in Australian hospitals, 2003

**Objectives**
To compare the autopsy rate in Australia in 2002–03 with the rate in 1992–93.
To assess the attitudes of hospital administrators and pathologists regarding importance of autopsies.

**Design and setting**
Cross-sectional surveys of pathologists and of hospital administrators, across all Australian states and territories.
*Laboratories:* Surveys were sent to 67 anatomical pathology laboratories accredited for pathology training by the RCPA.
*Administrators:* Surveys were sent to hospital administrators on a mailing list purchased from the Prospect Shop (Sydney). In addition, 5–6 private hospitals were randomly selected from each state. In total, surveys were sent to 198 hospitals, including 34 to private hospitals.

**Overall response rates**
*Laboratories:* 31/67 (47%): 23/53 (43%) public and 4/14 (29%) private hospitals, and 4 of unknown status.
*Administrators:* 94/198 (48%): 83/166 (50%) public and 11/34 (32%) private hospitals.

**Current arrangements for autopsy services**
*Laboratories:* Dedicated facilities, 27/31 (87%); arrangements with other hospitals, 4/31 (13%).
Of those with dedicated facilities, 22/31 (71%) performed autopsies for other public hospitals, 23/31 (74%) for private hospitals, 13/31 (42%) for general practitioners, 5/31 (16%) for research organisations, and 16/31 (52%) for the coroner.
*Administrators:* Dedicated facilities, 42/94 (45%); arrangements with other hospitals, 52/94 (55%).
From the 52 without dedicated facilities, there were 70 responses regarding reasons for not having dedicated facilities: better service elsewhere, 30/70 (43%); nobody to perform autopsies, 24/70 (34%); cost, 10/70 (14%); and no interest, 6/70 (9%).

**Changes in autopsy rates (laboratory survey)**

| | 1992–93 (9893 deaths) | | 2002–03 (11 717 deaths) | | Change |
|---|---|---|---|---|---|
| Type of patient | Autopsies | Proportion of deaths | Autopsies | Proportion of deaths | No. (%) |
| Adult | 1377 | 13.9% | 544 | 4.6% | −833 (−60.5%) |
| Paediatric | 101 | 1.0% | 34 | 0.3% | −67 (−66.3%) |
| Perinatal ⩾ 20 weeks | 367 | 3.7% | 428 | 3.7% | 61 (16.6%) |
| Perinatal < 20 weeks | 239 | 2.4% | 381 | 3.3% | 142 (59.4%) |
| Total | 2084 | 21.1% | 1387 | 11.8% | −697 (−33.4%) |

Adult autopsies comprised 66% of the hospital autopsies in 1992–93 and 39% in 2002–03. Perinatal autopsies increased from 606 (29%) in 1992–93 to 809 (58%) in 2002–03.

**Person who obtains consent for autopsy (laboratory survey)**
Registrar involved in the case, 15/31 (48%); senior clinician, 14/31 (45%); resident or intern, 14/31 (45%); grief counsellor, 1/31 (3%); other, 4/31 (13%) (including research nurse, midwife, brain bank coordinator). The total exceeds 100% because more than one category was involved in some hospitals. Pathologists reported being involved in obtaining consent in 6/31 replies (19%). Fifteen (48%) reported they were not involved, and the question was not answered by the other 10 laboratories.

**Turnaround time for autopsy results (laboratory survey)**
Preliminary macroscopic reports were issued by 17/31 laboratories (55%); 95% of these reports were issued within 3 working days of the autopsy.
Time to final report ranged from 5 days to 8 weeks.

**Hospital death audit**
*Laboratories:* Hospital deaths were reviewed at morbidity and mortality meetings in 20/30 laboratories (67%), reviewed by quality assurance staff in 5/30 (16%), ad hoc arrangements occurred in 3/30 (10%), and no reviews were conducted in 2/30 laboratories (6%). Pathologists were involved in morbidity and mortality meetings at 11/17 laboratories (65%).
*Administrators:* Hospital deaths were reviewed at morbidity and mortality meetings in 58/94 hospitals (62%), by quality assurance staff in 46/94 (49%), and both of the previous in 36/94 (38%). There were no reviews in 11/94 hospitals (12%).
Pathologists were involved in morbidity and mortality meetings at 21/56 hospitals (38%).

**Views on the importance of autopsies**
Administrators were asked about importance of autopsies in providing quality care. Responses were high importance, 30/91 (33%); moderate importance, 50/91 (55%); little importance, 2/91 (2%); not important, 9/91 (10%).
The surveys also included an open-answer question on importance of autopsies. Responses were graded as highly supportive, moderately supportive and unsupportive:

| | Highly supportive | Moderately supportive | Unsupportive |
|---|---|---|---|
| Administrators ($n = 38$) | 9 (24%) | 25 (66%) | 4 (11%) |
| Laboratories ($n = 26$) | 7 (27%) | 14 (54%) | 5 (19%) |

Most supportive comments concerned the value of the autopsy for quality assurance. A few commented on its value for training medical students and junior doctors.
Respondents with unsupportive comments recognised that autopsies could be useful, but with current low rates and poor integration with quality assurance programs the difference they are making is limited.
There was also a general comment on the administrative burden: "The request forms for autopsies are the main cause of the almost complete absence of requests for adult hospital autopsies."

where rates had previously been above the contemporary average. Although some community resistance probably exists, its extent may be overstated. In a study of the decline in the autopsy rates in the United Kingdom after the "organ retention scandal",[32] when asked to give consent for autopsy next of kin granted it in 43.4% of cases. Furthermore, the experience with brain banks suggests that, if family members are well informed and approached in a considerate manner, there exists a substantial degree of altruistic support in the community for autopsy-based research.[30]

Another factor is a reduced rate of requests for permission for autopsy by clinicians. In one study, clinicians requested autopsy in only 6.2% of cases, despite consent being given in 43.4% of cases.[32] Several other studies suggest that concerted efforts by hospitals, clinicians and pathologists could increase autopsy rates by about 50%.[35,36] In Australia, an increase in autopsy rates was achieved by a concerted effort

**2: Requirements to improve the autopsy rate**

A quality autopsy service with:

- sufficient pathologists with skills and an interest in autopsy pathology and enough time to provide a high standard of service
- adequate trained support staff and modern facilities, with sufficient laboratory support to provide histology and other tests in a timely way
- information provided to the clinicians as soon as possible after the autopsy for use in communication with the family
- final written reports which are accurate, timely and sufficiently detailed but "user friendly". A "plain English" summary for the relatives could be useful
- clinicopathological correlation, with formal review of the results of all deaths in which an autopsy was done.

Recognition of the role of the autopsy in the hospital by support from administrators, health managers, quality assurance committees and others.

Continuing support from the RCPA and recognition by other medical colleges, university medical schools and other medical professional and teaching bodies of the contribution the autopsy can make to their work.

Support from federal, state and territory government agencies not only by funding but also by recognising autopsy as a key quality assurance activity for clinical governance of health services. There should also be support for enhanced data collection and performance of cost–benefit studies.

Provision of information to families and the community about the autopsy to help them understand about the illness of their relative and to increase confidence in the health system so people do not see autopsy as a violation of personal integrity.

to use the autopsy as a quality assurance tool — rates rose from 7% in late 1998 to 35% in 2000–2001, with a next-of-kin refusal rate of only 11%.[34]

The clinical standing of the person requesting consent from the family is often considered important for securing consent. In our survey, senior clinicians were involved in obtaining consent from next of kin in 45% of deaths (Box 1). It is the current position of the RCPA that a senior medical officer should seek consent for the autopsy.[9] However, a recent report suggests that the effect of the professional standing of the person seeking consent may not be as great as supposed. Although consultants obtained consent for full autopsy more frequently (88.1%) than medical trainees (83.5%) and midwives (79.2%), trainees obtained consent more frequently for research and teaching on organs, and midwives more frequently for research on tissues.[37] In the setting of paediatric pathology, direct interaction between the pathologists and next of kin has been successful.[38] In our survey, just less than a third of pathologists reported some involvement with seeking consent, but usually with a member of the clinical team and only to provide advice of a "technical" nature.

One reason suggested for why clinicians and hospitals might not encourage autopsies involves concern over potential litigation if a clinically important misdiagnosis is identified. This was examined in a systematic review,[11] which identified only one study (from the University of Pittsburgh Medical Center in 1994). Of 176 autopsies in the series, follow-up found only one malpractice suit, and the intention to sue was known before death.[10]

With limited resources for healthcare, autopsies may not be perceived as a high priority. In our survey, 80 health administrators (88%) considered autopsies vitally or moderately important as a quality-assurance tool (Box 1) and agreed that they are an important part of assuring high-quality clinical services. The general comments also reflected this view. However, remarks by pathologists indicated that there are many situations in Australia where autopsy facilities are not maintained and funding is not provided for staffing the autopsy service.

There are no well-developed views on arrangements for funding autopsies. In the UK, a diversity of arrangements was identified in a review in 1995.[39] Our survey found diverse arrangements in Australia, and even greater divergence of opinion on autopsy cost, and consequently the charge to be made. Consistently, however, autopsies are not funded in the private sector. This is a major concern that the RCPA believes the Commonwealth should address as a safety and quality issue. The concept of a Medicare Benefits Schedule number for autopsies warrants investigation. However, clearer details of the costs of autopsies are needed first.

Lack of funding is not the only administrative issue. Respondents to our survey expressed the opinion that the complex administrative arrangements surrounding authorisation of an autopsy form an onerous task for hard-pressed junior medical staff and are a major disincentive to seeking consent.

The role of pathologists in contributing to the decline of the autopsy also needs consideration. Replies to the survey indicated that most pathologists consider autopsies to be valuable and important for quality assurance in healthcare (although negative comments were received from a few pathologists). Whether the current standard of service provided is adequate for this purpose is arguable. Communication of results appears to be almost entirely by written reports, with limited attendance at autopsies by clinicians and, conversely, little involvement of pathologists in death audit meetings (Box 1). This is a particular concern given the data about the error rate of antemortem diagnosis.

Workforce shortages[40] and workload pressures for anatomical pathologists may also limit their availability to perform autopsies.

An unexpected finding in the survey was the steady increase in the number of perinatal autopsies. To the best of our knowledge, this has not been noted previously and requires further examination. This increase was particularly evident in the number of examinations of fetuses of less than 20 weeks' gestation (Box 1). One factor may be that paediatric and perinatal pathologists are more likely to practise in a tertiary hospital and, because of their special skill, training and interest, are likely to perform these difficult autopsies.[41-43]

## What can be done to stop the decline and increase autopsy rates?

Various measures, if adopted (preferably in combination rather than alone), have the potential to halt and possibly reverse the decline in the autopsy rate (Box 2). However, to implement these measures will require cooperative action at several levels in the healthcare system. These include improvements in service from pathologists, better interaction between pathologists and medical staff involved with the care of the patient, and better support from administrations of institutions by allocating adequate resources, improving administrative requirements, and encouraging greater pathologist involvement in investigating safety and quality of patient care. At a higher organisational level, support and encouragement is needed from the organised medical profession and state, territory and federal governments and their agencies. Although some of this may involve provision of resources for improved facilities, there also needs to be support for health service research with better data collection, leading to a "business case" for the autopsy. However, none of this will be successful unless community support is forthcoming. The public has a major interest in the standard of healthcare and in recent advances in medical science. This must be complemented by improvements in the care of the bereaved by hospitals.[44] If this is achieved, the question of autopsy would be one element integrated in a comprehensive caring approach to the needs of close relatives at the time of the death of a member of the family. For this to succeed, community awareness of the role and value of autopsies should be enhanced by providing high-quality media information to the public, with pathologists and other members of the medical profession playing an active role.

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