Australian and New Zealand
College of Anaesthetists

Safety of Anaesthesia in Australia

A review of anaesthesia related mortality 2000 - 2002

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SAFETY OF ANAESTHESIA IN AUSTRALIA

A REVIEW OF ANAESTHESIA RELATED MORTALITY 2000-2002

Report of the Committee convened under the auspices of the
Australian and New Zealand College of Anaesthetists

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FOREWORD

The collection of anaesthesia related mortality data in Australia has provided world leadership. This has been achieved as a result of: anaesthetists with a high level of commitment to the field of quality and safety; the proclamation of confidentiality of the State Committees by State Governments; the achievement of a very high response rate from anaesthetists, in view of the voluntary reporting, confidentiality and focus on improved safety; and the cooperation of State Coroners. All of these vital ingredients have contributed in a manner that has not been achieved elsewhere in the world, and the anaesthesia related mortality rates reported have been amongst the lowest in the world.

Individual States have been collecting data on deaths associated with anaesthesia since 1960, with only minimal coordination among individual States regarding data collected and its interpretation. However, commencing from 1985, the various State-based Committees agreed to combine their data to enable the development of national reporting. The National Health and Medical Research Council, (NHMRC) coordinated the first two reports and subsequently the Australian and New Zealand College of Anaesthetists (ANZCA) has coordinated the last four reports. This current report covers the triennium 2000 – 2002.

In the current report, the number of anaesthesia attributable deaths in relation to the total population has remained relatively stable compared to the previous report. A total of 1988 deaths were considered by State Committees, yielding 137 in which anaesthesia was thought to play some part. Whilst any adverse outcome is regrettable, these figures compare very favourably with such anaesthetic mortality data as are available from other developed countries. Nevertheless, factors have been identified which could yield an even further reduction in anaesthesia related mortality. This is the major aim of these reports.

In the past it has been surprisingly difficult to obtain data from various bodies concerning the actual number of anaesthetics administered per year, and all previous figures have been an estimate using varied methodology. However, anaesthesia specific coding was introduced for the first time during this triennium, and was used to estimate the total number of anaesthetics nationwide. This provided an anaesthesia-related mortality rate of about one death for every 56,000 anaesthetics. This figure cannot be compared to the previous triennium due to the improved methodology used to estimate the number of anaesthetics. Nevertheless, a rate of 1 in 56,000 is extremely low by international standards. Future reports may contain even more accurate information due to increased familiarity with anaesthesia specific coding and thus improved accuracy of denominator data.

In addition to improving patient safety, this report provides a rich source of information for trainees and currently practising anaesthetists, particularly with respect to the documentation of causal and contributory factors. This information will be disseminated to all appropriate bodies in order to contribute to further improvements in patient safety.

The report would not be possible without the dedicated efforts of members of State Mortality Committees, together with the provision, often voluntarily, of information from practising anaesthetists across the country. We would also like to acknowledge the cooperation and interest of State Coroners.

MICHAEL J. COUSINS, AM
President, ANZCA
Chairman, Anaesthesia Mortality Committee

COMMITTEE

The Committee that produced this report consisted of the President of the Australian and New Zealand College of Anaesthetists (ANZCA) and the Chairs of the State Mortality Committees

Professor Michael Cousins, AM (Chairman)	ANZCA
Dr Christopher Borton	New South Wales
Dr Peter Gartrell	South Australia
Dr Neville Gibbs	Western Australia
Associate Professor Larry McNicol	Victoria
Dr James Troup	Queensland
Mrs Carolyn Handley (Executive Officer)	ANZCA

State Mortality Committees

Details and Terms of Reference of State Mortality Committees – see Appendix 1.

EXECUTIVE SUMMARY

1. Australia has comprehensive processes in place to record anaesthesia-related mortality. However, the classification of anaesthesia-related deaths relies on expert opinion and is always subjective to some extent. Moreover, there are different methods of data collection among the States, as well as minor differences in definitions and classifications The accuracy of anaesthesia-related mortality rates depends also on the reliability of the denominator (number of anaesthetics performed). This figure still remains a best estimate. Despite these limitations, this report is likely to provide the most accurate and up to date information on anaesthesia-related mortality available from any source

2. In this report, 'anaesthesia-related' deaths were defined as all deaths classified into Categories 1-3 of the National System of Classification of Anaesthesia Mortality (table 1). The 137 anaesthesia-related deaths had a similar distribution across Categories 1, 2 and 3 as in the previous triennium. It should be noted that in only 42 of the 137 cases was it considered 'reasonably certain' that solely anaesthesia-related factors contributed to deaths. In the remaining 95 cases there was either 'some doubt', or both 'anaesthetic' and 'surgical' factors were implicated.

3. The number of anaesthesia-related deaths for the 2000-2002 triennium was similar to the number in the previous triennium. The 137 cases represented an increase of 7 cases or 5.3%, however during this time there was a 3% increase in population. This indicates that the number of anaesthesia-related deaths on the basis of population was similar to the previous triennium.

4. During the 2000-2002 triennium, anaesthesia specific codes were introduced for general anaesthesia, regional anaesthesia, sedation, and pain management procedures For the first time it was possible to obtain a figure for the number of anaesthetics administered, independent of the number of surgical procedures performed. For the 12 months from July 2001 to June 2002, there were about 2.586 million anaesthetic procedures coded nationally. By multiplying this number by three, an estimate for the triennium was obtained. This estimate (7.65 million) was substantially lower than the estimate for the previous triennium (10.5 million). At present, it is not clear whether previous reports overestimated the total number of anaesthetics, or whether the current figure is an underestimate. This may become clearer in future reports. Assuming the current estimate is correct, the anaesthesia-related mortality for the 2000-2002 triennium was about 1 in 56,000 anaesthetics. This rate cannot be compared to the previous triennium due to the improved methodology used to obtain the denominator. Nevertheless, a rate of 1 in 56,000 remains extremely low by international standards.

5. The number of reports to State Committees (1988) increased compared to the previous triennium (1647). This was due to an increase in reports considered in NSW as a result of their adoption of the national system of classification (table 1) for this triennium There was also a substantial increase in the number of unassessable deaths (Category 7-8, table 1) As in previous reports, there was considerable disparity in the number of deaths reported in various States, which requires attention.

6 The majority of the anaesthesia-related deaths occurred in medically compromised patients (ASA P 4-5), older patients, and those undergoing urgent or emergency procedures. In general, fitter patients, those under the age of 40y, and those undergoing elective procedures had a much lower incidence. However, nearly 20% of deaths occurred in ASA P 1-2 patients, which is cause for concern.

7 In comparison with the previous triennium, there was a decrease in the number of deaths in which inappropriate anaesthesia technique was considered a causal or contributory factor. In particular, airway and ventilation related problems were less common. However, deficiencies in pre-operative assessment, resuscitation, supervision, and crisis management were more common. Overall, as in previous reports, there was an average of about 2.5 causal or contributory factors per anaesthesia-related death.

8. In 28 cases there was no correctable factor identified. This represented about 20% of all anaesthesia-related deaths This indicates that in a subset of cases an anaesthetic contribution to death is considered unavoidable. It is anticipated that this would apply mostly to medically compromised patients. The corollary is that in 80% of cases, at least one potentially avoidable factor was identified.

9. A significant proportion of deaths (25%) continue to occur in cases undertaken by non-specialists and trainees. Unfortunately, the relative number of anaesthetics given by non-specialists is not known It is also not known whether the outcome would have been different if a specialist had been available Nevertheless, the optimal model of care would include access to specialist services for all patients requiring anaesthesia, particularly for those at higher risk. This includes all medically compromised patients, those over 60y, and those undergoing complex or emergency procedures Four deaths occurred in patients for whom the anaesthetic was administered by the same person performing the procedure. This practice is unsafe and is rarely if ever acceptable, even in the most extreme situations.

10 A significant proportion of post-operative deaths continue to occur in ward areas (15%) Patients in these areas have lower levels of monitoring and supervision than those in High Dependency or Intensive Care Units. It is possible that these factors contributed to anaesthesia-related mortality in these cases. The resources available for post-operative care should be considered when undertaking high-risk cases. In all cases, appropriate mechanisms should be in place for the early recognition and transfer of patients who cannot be managed optimally at a ward level.

11. There was a broad range of surgical procedures over which the 137 deaths occurred This is not unexpected, because the type of surgery should not influence anaesthesia-related mortality, so long as the level of care and resources are appropriate However, it should be noted that 66% of all deaths occurred in urgent or emergency cases, suggesting that these cases present a reduced margin of safety and require increased attention and resources. Thirteen cases involved non-invasive procedures such as endoscopy, and two involved pain management.

12. This report indicates that anaesthesia-related mortality in Australia for the 2000-2002 triennium was extremely low. The low incidence should be both encouraging and reassuring to anaesthetists, other health professionals, those involved in the administration of health care in Australia, and most of all, the wider community. However, there remain potentially avoidable causal or contributory factors in the majority of deaths. This report has identified several areas of anaesthetic practice that warrant further attention, with the aim of further and continued improvement in anaesthesia safety in Australia.

Recommendations

The ANZCA Committee on Anaesthetic Mortality makes the following recommendations:

1 Anaesthetists, patients, and those involved in health care delivery in Australia should be reassured about the high level of anaesthetic safety in Australia. However, it should be recognized that there is scope for even further improvement.

2. Anaesthesia should be provided by specialist anaesthetists or appropriately supervised trainees wherever possible, especially for ASA P 4-5 patients, small children and neonates, those >60y of age, and those undergoing urgent, emergency, or complex procedures. There should be continued emphasis on maintenance of professional standards for specialists, appropriate supervision of trainees, and continuing professional development, training and credentialling for non-specialist medical practitioner anaesthetists.

3. Higher risk patients require increased attention to pre-operative assessment and an appropriate level of post-operative monitoring and supervision. Improvements in post-operative care require increased access to High Dependency or Intensive Care Units when necessary, and earlier intervention for ward patients who become unstable. Particular attention should be paid to assessment and resuscitation of patients undergoing urgent or emergency procedures.

4. Advanced training in airway and crisis resource management should be mandatory for all medical personnel undertaking anaesthesia or sedation for interventional medical or surgical procedures.

5 Mechanisms should be developed for more accurate and complete data collection, not only of deaths that may be anaesthesia-related, but also of deaths that occur in relation to sedation and pain management. This may require changes to State Health Acts or Coronial Legislation. The culture of reporting of peri-operative deaths should be encouraged through the provision of appropriate and timely feedback, the assurance of confidentiality, and the demonstration that the information collected is used to further improve anaesthesia safety in Australia.

6. The National Anaesthetic Mortality Committee, under the auspices of the Australian and New Zealand College of anaesthetists, should consider itself an agent for change, and should be proactive in promoting the recommendations of this report. To this end, the information in this report should be disseminated widely in Australia With improvements in data collection and access, it should be possible to publish future reports closer to the triennium examined.

METHODS

Data collection

Confidentiality of information, an absolute requirement for all Committees, was ensured by no primary data being examined in the compiling of the report.

1. State Coronial Acts and the collection of data – see Appendix 2

While there is mandatory reporting to Coroners in all States, there is lack of uniformity about the reporting requirements in the specification of deaths associated with anaesthesia in various State Coronial Acts. There is no definition of anaesthesia or specified range of procedure or uniformity of time interval, and most of the Acts do not mention sedation as distinct from anaesthesia. Reporting to Anaesthetic Mortality Committees is not mandatory except in Western Australia, and the efficacy of data collection depends on voluntary reporting and the degree of cooperation between the State Committees and the Coroners' offices. Queensland and Victoria, with the least prescriptive requirements, have the lowest level of reporting relative to population – see Table 3.

2. Uniformity in analysing reports

In order to achieve greater uniformity between the States in analysing reports, the Committee in March 2000 agreed on a Glossary of Terms to be used wherever possible – see Appendix 3.

System of classification

The system of classification and the term "death attributable to anaesthesia" is defined in Table 1 and the report focuses on deaths in which anaesthesia played a part, i.e., Category 1-3 in Table 1. For the most part, the term 'anaesthesia-attributable' has been replaced with 'anaesthesia-related' in this report.

Table 1. System of classification by Anaesthesia Mortality Committees

A. Death Attributable To Anaesthesia	
Category 1	Where it is reasonably certain that death was caused by the anaesthesia or other factors under the control of the anaesthetist
Category 2	Where there is some doubt whether death was entirely attributable to the anaesthesia or other factors under the control of the anaesthetist
Category 3	Where death was caused by both surgical and anaesthesia factors
Explanatory Notes: • The intention of the classification is not to apportion blame in individual cases but to establish the contribution of the anaesthesia factors to the death • The above classification is applied regardless of the patient's condition before the procedure. However, if it is considered that the medical condition makes a substantial contribution to the anaesthesia-related death, subcategory H should also be applied. • If no factor under the control of the anaesthetist is identified which could or should have been done better, subcategory G should also be applied	
B. Death Attributable To Anaesthesia	
Category 4	Death where the administration of the anaesthesia is not contributory and surgical or other factors are implicated
Category 5	Inevitable death, which would have occurred irrespective of anaesthesia or surgical procedures.
Category 6	Incidental death which could not reasonably be expected to have been foreseen by those looking after the patient, was not related to the indication for surgery and was not due to factors under the control of the anaesthetist or surgeon
C. Unassessable Death	
Category 7	Those that cannot be assessed despite considerable data but where the information is conflicting or key data are missing.
Category 8	Cases that cannot be assessed because of inadequate data

FINDINGS

Number of deaths classified

The total number of deaths reviewed for the triennium was 1988 of which 137 were considered to be wholly or partly related to anaesthetic factors.

Table 2. Number of deaths classified by each Committee.

	Classified	Category I	Category 2	Category 3	Total Related to Anaesthesia
NSW & TAS	1003	19	19	29	67
VIC	279	17	12	10	39
SA & NT	304	0	2	1	3
WA	306	2	13	1	16
QLD	96	4	4	4	12
Total	1988	42	50	45	137

71 additional cases were classified unassessable due to inadequate or conflicting data (Category 7 or 8, table 1).

Tasmania reports cases to the New South Wales Committee and the Northern Territory to the South Australian Committee. There were no reports from the Australian Capital Territory over this period (The Australian Capital Territory contains only about 1.5% of the population of Australia)

The disparity in total cases reviewed by each State reflects both population differences and different requirements for reporting in different States.

Number of deaths considered in relation to population

The total number of deaths considered by each Committee relative to the population in which the deaths occurred gives some indication of the efficiency of reporting. The population was taken as the estimated resident population for 2001.[1] (The 'estimated resident population' is considered more accurate than the 'census' figure.[1])

Table 3. Number of deaths classified related to population

	NSW & TAS	VIC	SA & NT	WA	QLD	Total
Population (x million)	7.05	4.80	1.71	1.90	3.63	19.41
Total No. of deaths considered	1003	279	304	306	96	1988
No. considered per million	142.3	58.1	177.7	161.0	26.4	102.4

Population source – Australian Bureau of Statistics 2001.1 (Total includes 0 32 million in the ACT)[1]

As noted in previous reports, differences in the reporting mechanisms and workings of the various State Committees are probably the reason for the wide variation between States Western Australia has the highest number of reports relative to population. This is most likely due to the legal requirement that all deaths up to 48 hours after anaesthesia must be reported to the Committee Other States have less stringent requirements and in the case of Victoria and Queensland, where the lowest figures are recorded, reporting is voluntary. At present, Tasmania reports to the NSW Committee and the two States are considered together. However, reporting is less likely to be as complete in Tasmania For further details refer to Appendices 1 and 2

Number of anaesthesia-related deaths (Category 1-3) in relation to population and numbers considered

Table 4. Number of anaesthesia-related deaths during the triennium, in relation to the population and to the number of deaths classified

No. of deaths considered anaesthesia related	137
No. of anaesthesia related deaths per million population	7.06
No. of anaesthesia-related deaths per 100 deaths considered	6.9

These figures are similar to the previous triennium (1997-1999[3]), in which there were approximately 6.88 anaesthesia-related deaths per million population, and 7.9% of deaths were classified as anaesthesia-related per 100 considered.

Table 5. Number of anaesthesia-related deaths in comparison with previous reports

	1994-1996[4]	1997-1999[3]	2000-02
NSW & TAS	62	56	67
VIC	35	32	39
SA & NT	10	11	3
WA	19	11	16
QLD	9	20	12
Total	135	130	137

The total number of anaesthesia-related deaths per triennium has been relatively constant since 1994-1996. However, during this time there has been a steady increase in population. The absence of a significant increase in the number of anaesthesia-related deaths is encouraging.

Causal or contributory factors in anaesthesia-related deaths – see Appendix 3

The findings as to which aspect of anaesthetic factors contributed to death are shown in Table 6.

Table 6. Causal or contributory factors in anaesthesia–related deaths

	NSW & TAS	VIC	SA & NT	WA	QLD	Total
A PREOPERATIVE	**30**	**12**	**4**	**7**	**5**	**58**
i assessment	21	8	2	6	4	**41**
ii management	9	4	2	1	1	**17**
B ANAESTHESIA TECHNIQUE	**24**	**17**	**1**	**8**	**5**	**55**
i choice of application	18	8	1	4	0	**31**
ii airway maintenance	5	1	0	2	2	**10**
iii ventilation	1	4	0	1	0	**6**
iv circulatory support	0	4	0	1	3	**8**
C ANAESTHESIA DRUGS	**30**	**22**	**1**	**7**	**3**	**63**
i selection	7	7	0	3	0	**17**
ii dosage	21	4	1	3	1	**30**
iii adverse event	2	8	0	1	2	**13**
iv incomplete reversal	0	2	0	0	0	**2**
v inadequate recovery	0	1	0	0	0	**1**
D ANAESTHESIA MANAGEMENT	**44**	**7**	**0**	**4**	**7**	**62**
i crisis management	10	5	0	4	4	**23**
ii inadequate monitoring	17	1	0	0	3	**21**
iii equipment failure	0	0	0	0	0	**0**
iv inadequate resuscitation	17	1	0	0	0	**18**
v hypothermia	0	0	0	0	0	**0**
E POSTOPERATIVE	**26**	**23**	**3**	**4**	**3**	**59**
i management	14	10	2	2	2	**30**
ii supervision	7	7	1	2	1	**18**
iii inadequate resuscitation	5	6	0	0	0	**11**
F ORGANISATIONAL	**19**	**12**	**0**	**2**	**2**	**35**
i inadequate supervision or assistance	9	5	0	2	0	**16**
ii poor organisation	10	5	0	0	1	**16**
iii poor planning	0	2	0	0	1	**3**
G NO CORRECTABLE FACTOR	**18**	**7**	**0**	**2**	**1**	**28**
H MEDICAL CONDITION PATIENT A SIGNIFICANT FACTOR	**NA**	**25**	**2**	**5**	**6**	**38**

In 28 cases (20%) no correctable factor could be identified. This suggests that in some patients anaesthetic factors may still contribute to death despite optimal anaesthetic management. It is likely that this occurs mostly in those patients who are significantly medically compromised pre-operatively, and whose condition cannot be improved prior to surgery. These deaths may be considered 'unavoidable' with the current state of anaesthetic and surgical knowledge. The corollary is that the remainder of the deaths (80%) were associated with at least one potentially avoidable factor.

In 38 cases, while death was partly or wholly attributable to anaesthesia, the poor medical condition of the patient was considered an important factor. This probably represents a reduced margin of safety due to a reduced reserve in this group of patients. It is likely that the figure would have been higher had NSW been employing this classification during the triennium.

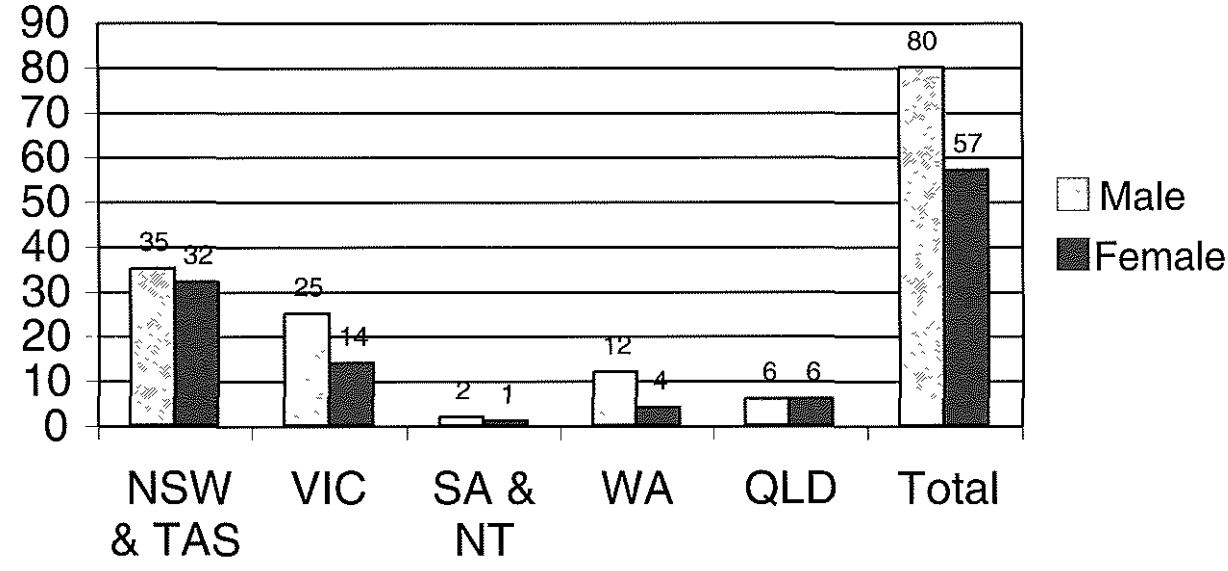
The most common causal or contributory factors were inadequate pre-operative assessment (41), inappropriate anaesthetic choice (31), inappropriate anaesthetic dosage (30), inadequate resuscitation (29), inadequate supervision or assistance (34), inadequate crisis management (23), and inadequate monitoring (21). There was a substantial reduction in inappropriate airway management as a causal or contributory factor compared with the previous triennium (10 vs 23). Overall there were approximately 2.5 causal or contributory anaesthetic factors per anaesthesia-related death.

Inadequate monitoring was an uncommon contributory factor, except in NSW. Equipment failure was also an uncommon causal or contributory factor.

Gender

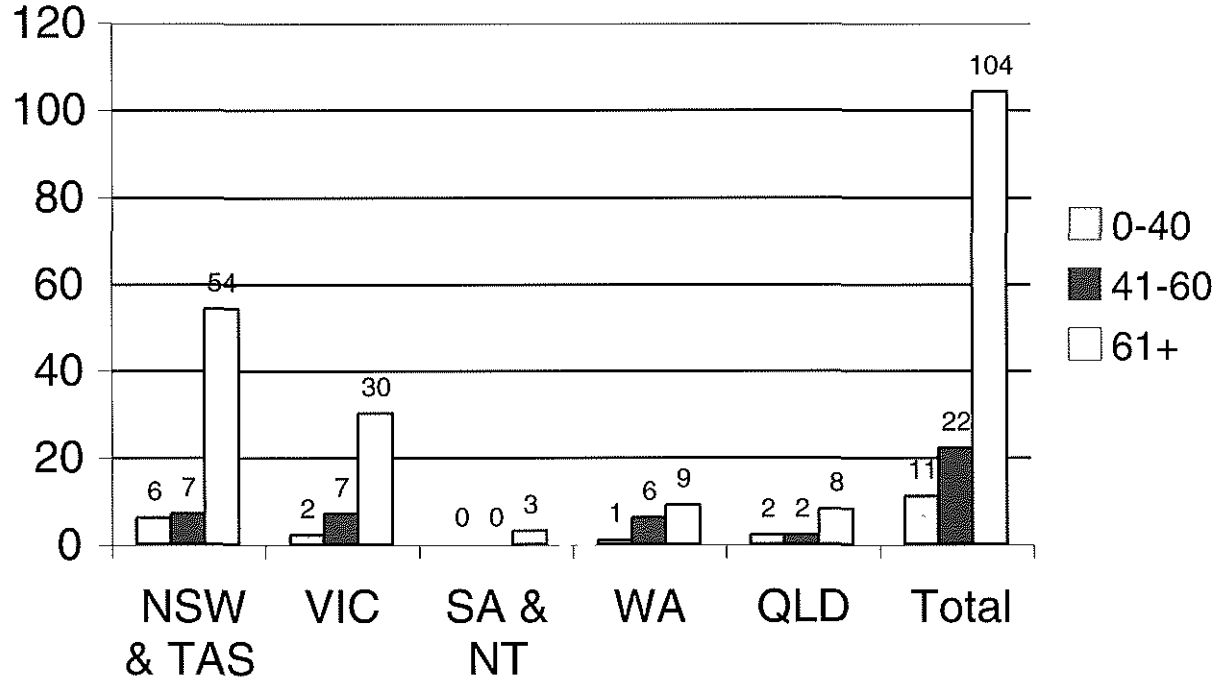
As in the two previous reports, there is a slight preponderance of males over females.

Figure 1. Gender distribution in anaesthesia-related deaths



Age

Figure 2. Age distribution in anaesthesia-related deaths

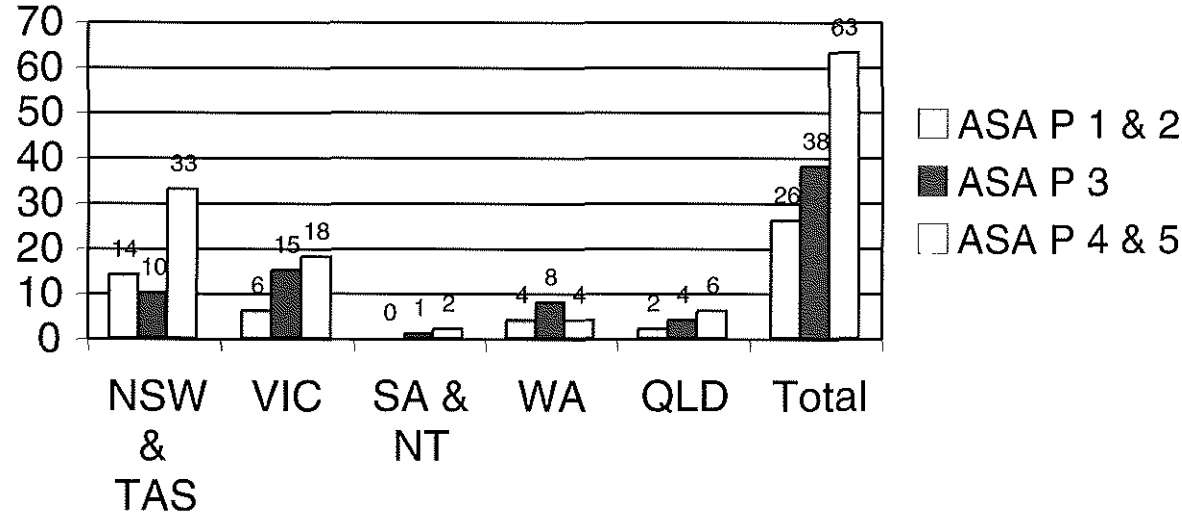


No anaesthesia-related deaths were recorded in children under 1 year of age. 76% of the deaths occurred in patients over the age of 60 years.

Level of risk

The level of risk was stratified using the American Society of Anesthesiologists (ASA) Physical Status Classification (see Appendix 4). While this classification is widely used, and may be considered the best available at present, it contains considerable scope for subjectivity, particularly between levels P 1-3.

Figure 3. Level of risk of patients by ASA Physical Status

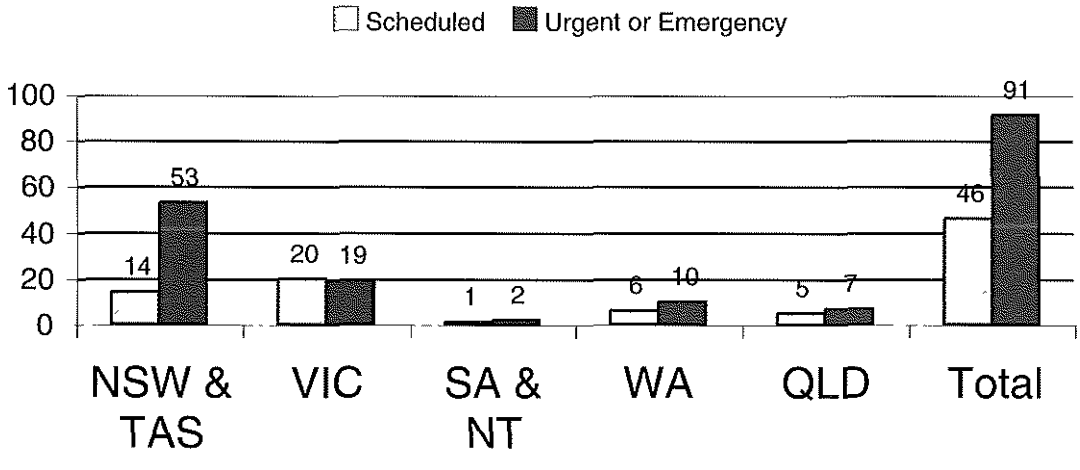


About 50% of anaesthesia-related deaths occurred in patients with the highest levels of risk (ASA P 4-5) However, there were 26 low risk patients (ASA P 1- 2). The number of anaesthetic-related deaths in ASA P 1-2 patients continues to be of concern.

Degree of urgency

A three-part scale is used. Emergency denotes a procedure that must be performed as soon as possible. Urgent indicates a lesser degree of urgency where time is available to improve the patient's condition, and the time of the procedure can to some extent fit in with the availability of staff and operating theatres. Scheduled indicates that the case was booked at least 24 hours in advance.

Figure 4. Degree of urgency of the procedure



While the total number of patients undergoing scheduled procedures far outnumbers those requiring urgent or emergency procedures, 66% of the anaesthesia-related deaths occurred in patients undergoing urgent or emergency procedures. The increased risk associated with urgent or emergency procedures may relate to the unstable condition of these patients, the inadequate opportunity for complete pre-operative assessment, or a requirement for continued resuscitation at the same time of the administration of anaesthesia.

Type of Hospital

Table 7 shows the distribution between various types of hospital. There is some variation between States in designating type of hospital. The definition of teaching hospital has been reserved for major public institutions that are tertiary referral centres with postgraduate training programs as well as undergraduate teaching.

Table 7. Type of Hospital

	Metropolitan Public Teaching	Metropolitan Non Teaching	Rural Base	Rural Public Other	Private	Day Care (Free Standing)
NSW & TAS	39	19	3	1	4	1
VIC	13	7	5	2	11	1
SA & NT	2	0	0	0	1	0
WA	10	1	2	0	3	0
QLD	5	0	1	0	6	0
Total	69	27	11	3	25	2

As in previous reports, the majority of anaesthesia-related deaths occurred in metropolitan teaching hospitals. This was not unexpected because these hospitals treat the majority of urgent and emergency patients. They also undertake the bulk of the most complex procedures, which are usually performed on older, sicker patients with a higher level of risk.

Location of death

Table 8. Location of death

	Operating Theatre	Induction Room	Recovery Room	Procedural Room	ICU/High Dependency	General Ward	Not Specified
NSW & TAS	26	1	3	1	22	13	1
VIC	15	0	3	1	16	4	0
SA & NT	0	0	0	0	3	0	0
WA	3	0	2	0	7	4	0
QLD	6	0	1	0	5	0	0
Total	50	1	9	2	53	21	1

The majority of the deaths occurred in operating theatre precincts or in high dependency units. However, there is concern that there were 21 deaths in a general ward area. While the causes of death in these areas may have been due to a variety of factors, it is possible that limited monitoring and supervision contributed. This reinforces the view that all medically compromised patients undergoing complex surgery may require access to high dependency post-operative care or added supervision from a dedicated peri-operative medical service, and this should be considered before undertaking these cases.

Grade of anaesthetist

Table 9 shows the grade of the anaesthetist. In cases during which two or more anaesthetists were involved, the grade of anaesthetist was taken as the principal anaesthetist involved, as indicated in the anaesthetist's report.

Table 9. Grade of anaesthetist

	Specialist	Non-Specialist	Trainee/Registrar	Other	Operator
NSW & TAS	50	4	7	2	4
VIC	30	5	4	0	0
SA & NT	3	0	0	0	0
WA	11	0	5	0	0
QLD	11	1	0	0	0
Total	105	10	16	2	4

The majority of deaths involved specialist anaesthetists. This was not unexpected, because specialist anaesthetists perform the majority of anaesthetics, and they also undertake the majority of high-risk cases. However, there continues to be a significant number of anaesthesia-related deaths in cases performed by trainee or non-specialist anaesthetists. There were also four deaths in which the operator performed the anaesthetic. This is rarely acceptable, even in the most extreme circumstances.

Type of surgery

Table 10 depicts type of surgery or procedure.

Table 10. Type of surgery or procedure

	NSW & TAS	VIC	SA & NT	WA	QLD	Total
Abdominal	20	10	1	4	3	18
Cardiothoracic	6	3	0	2	0	11
Vascular	2	3	1	1	0	7
Neurosurgery	1	0	0	0	0	1
Orthopaedic	21	7	0	3	5	36
Urology	4	1	1	1	2	9
General (Non Abdominal)	2	2	0	1	1	6
ENT/Head and Neck	3	3	0	3	0	9
Eye	0	0	0	0	0	0
Renal	0	0	0	0	0	0
Gynaecological	0	1	0	1	0	2
Non-InvasiveProcedural•						
Endoscopy	7	6	0	0	0	13
Cardiac	0	0	0	0	0	0
Radiological	0	0	0	0	0	0
Other						
Obstetric	1	0	0	0	1	2
Resuscitation•	0	0	0	0	0	0
Pain Management	0	1	0	0	0	1
Invasive Monitoring	0	0	0	0	0	0
Nil	0	2	0	0	0	2

The most common types of procedures were orthopaedic, abdominal and endoscopic.

• Most State Coronial Systems do not specify reporting of mortality associated with sedation for such procedures. Therefore, it is believed that in this category, especially endoscopy, there is under-reporting as in previous reports. This may also apply to anaesthesia and sedation employed during resuscitation outside the operating theatre.

Number of anaesthetics administered annually

As foreshadowed in the previous report, a new method was used to estimate the total 'number of anaesthetics administered' during the 2000-2002 triennium. Coding of anaesthesia procedures was introduced in the year 2000. The first full year in which the Australian Institute of Health and Welfare (AIHW[2]) regularly collected these new codes was July 2001 – June 2002. Therefore, for the first time it was possible to obtain a direct estimate of the number of anaesthetics administered, independent of the number of surgical procedures performed. This information is presented in table 11.

Table 11.
Estimate of number of procedures involving anaesthesia during the year 2001-2002*

	Total Anaesthetic Procedures*
NSW	837991
VIC	647641
QLD	516783
WA	257762
SA	215225
TAS	62073
ACT	35878
NT	12995**
Total	2,586,348

*AIHW[2] (www.aihw.gov.au; Australian Hospital Statistics, July 1, 2001 to June 30, 2002. Procedures in ICD-10-AM groupings: 1820600-1820608; 1820900- 1820908; 1821300-1821301; 1821600-1821626; 1823000-1823001; 3914000; 9001800-9001802; 9001900-9001902; 9002000-9002002; 9250200-0250203; 9250300-; 9250302; 9794200; 9794300; 0794900. These include general, regional, and combined anaesthetic procedures. Total public and private (**Information from private hospitals in NT not available).

Using this new methodology, the estimate for the total number of anaesthetics administered was considerably less (2.586 million), than for a similar 12 month period in the previous triennium (3.445 million). It is not clear whether the previous figure was an overestimate, or whether the current figure is an underestimate. This may become clearer in future reports. However, it is considered unlikely that there has been a real decrease in the number of anaesthetics performed annually since the previous triennium.

Incidence of death related to anaesthesia

In order to calculate the incidence of death related to anaesthesia, it is necessary to have accurate data on the number of deaths (numerator) and the number of anaesthetics (denominator). Unfortunately, it is rarely possible to obtain completely accurate data of this type, so best estimates must be used. While all Australian States have comprehensive procedures in place to assess and record anaesthesia-related mortality, there is a lack of uniformity in methods of reporting between States. There is also no way of ascertaining whether all anaesthesia-related deaths were reported and classified correctly.

In the current triennium, the new method to obtain information on the total number of anaesthetics administered should have been more accurate than previous reports. Nevertheless, it is possible that the new figure is an underestimate, due to the relatively recent introduction of the new anaesthesia codes. Therefore, at present this figure remains a best estimate only. Multiplying the one year estimate by three in order to obtain an estimate for the triennium provides a total of 7.65 million. Using this figure, the anaesthesia-related mortality for the current triennium was about one death for every 56,000 anaesthetics. This rate cannot be compared to the previous triennium due to the improved methodology used to obtain the denominator. Nevertheless, it remains extremely low by international standards.

Incidence of death in patients considered to be good or fair risk

Table 12. Incidence of death in patients considered to be good or fair risk

Triennium	Number of ASA P 1-2 patients	Total Number of Category 1-3 Deaths	Percentage
1985-87*	64	153	42%
1988-90*	37	92	40%
1991-93**	30	116	26%
1994-96**	13	135	9.6%
1997-99**	19	130	14.6%
2000-02**	26	137	18 9%

This table demonstrates that there has been a slight increase in the proportion of anaesthesia-related deaths in low risk patients compared to the previous report. This proportion, while low, is of concern and warrants further investigation.

* The first two reports were published by the National Health and Medical Research Council[6,7]
** Subsequent reports have been under the auspices of the Australian and New Zealand College of Anaesthetists [3,4,5]

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APPENDICES

APPENDIX 1

TERMS OF REFERENCE OF STATE MORTALITY COMMITTEES

NEW SOUTH WALES SPECIAL COMMITTEE INVESTIGATING DEATHS UNDER ANAESTHESIA (SCIDUA)

This is a Ministerial Committee established in 1960 to enquire into deaths arising, during or as a result of anaesthesia. The Committee has met regularly since its inception, except for a three year period from mid 1980 to mid 1983 when there was concern about lack of legal safeguards for confidentiality of the Committee's activities. The primary function of the Committee is to review deaths related to anaesthesia and to give a report of this review of the anaesthetic management in each case to the anaesthetist involved.

Composition
The Committee consists of representatives nominated by:
Australian and New Zealand College of Anaesthetists
Australian Society of Anaesthetists
NSW Department of Health
Royal Australasian College of Surgeons
Royal Australian College of General Practitioners
Royal Australian College of Obstetricians and Gynaecologists
Royal College of Pathologists of Australasia
University of Newcastle, Department of Anaesthesia and Intensive Care
University of NSW, Disciplines of Anaesthesia and Surgery
University of Sydney, Departments of Anaesthetics and Surgery, and
Medical Secretary, Assistant Medical Secretary

Legislative Privilege
The Health Administration Act 1982 Section 23 gives the Minister authority to gazette bodies, conducting investigations into morbidity or mortality, for privilege in relation to information obtained. SCIDUA was scheduled as such a body on 9 December 1982 under Section 20(4) of the Act. Freedom of Information Act 1989 Schedule 1 Sections 8,12,13 exempts the Committee's documents from public access.

Case Reporting
When a death is required under the Coroners Act to be reported to the Coroner, the patient's name is notified to the Special Committee by arrangement with the Coroner's office. The SCIDUA Secretariat then contacts the anaesthetist concerned requesting case details on the SCIDUA Report Form.

Case Reviews
The Committee meets monthly to review cases reported. The names of patient, hospital and anaesthetist are deleted from the forms circulated to Committee members. In addition to each clinical report, details are also given to Committee members regarding status of the anaesthetist (consultant, registrar, etc), age and sex of the patient and date of death. All case report forms reviewed by Committee members are returned to the Secretariat when the cases have been considered.

Reporting Processes
The reporting anaesthetist is notified of the Committee's classification of the death. When one or more anaesthetic factors is considered to have contributed to the fatal outcome, this takes the form of a personal letter from the Chairman. SCIDUA also receives and analyses reports from Tasmania.

Other Reports
A report is sent to the Minister annually. Matters of importance or concern regarding anaesthetic practices are brought to the attention of anaesthetists generally by reports in Specialist Journals.

Website: http://www.cec.health.nsw.gov.au/specialcomms.html

VICTORIAN CONSULTATIVE COUNCIL ON ANAESTHETIC MORTALITY AND MORBIDITY

The Victorian Consultative Council on Anaesthetic Mortality and Morbidity was established in 1976 by the Minister for Health under Section 13 of the Health Act 1958 following representations from the Faculty of Anaesthetists of the Royal Australasian College of Surgeons and recommendations from the National Health and Medical Research Council. The Council now operates pursuant to Section 24 of the Health Act (as amended).

Membership

The members of the Council are:

The Chairman, a specialist anaesthetist appointed by the Minister for Health and Cabinet.
13 Specialist anaesthetists nominated by:

- The Australian Society of Anaesthetists
- The Australian and New Zealand College of Anaesthetists
- Victorian teaching and regional hospitals and the Rural Visiting Medical Officer (VMO)

5 representatives nominated by:

- The Australian and New Zealand Intensive Care Society
- The Royal Australasian College of Surgeons
- The Victorian Institute of Forensic Medicine
- The Australasian College for Emergency Medicine
- The Department of Human Services

Terms of Reference of the Council

- To monitor, analyse and report on key areas of potentially preventable anaesthetic mortality and morbidity within the Victorian hospital system
- To keep a register of anaesthetic mortality and morbidity within the Victorian hospital system
- To liaise with other Consultative Councils on issues of common concern, including the development of appropriate systems for reporting of relevant cases by practitioners
- To improve the practice of anaesthesia by publication and dissemination of relevant information and practical strategies identified during deliberations of the Council
- To report as required to the Minister for Health and to the Statewide Quality Council
- To respond to specific matters referred to the Council by the Minister for investigation and reporting, as required.

The Victorian Council is the only State Mortality Council that also has a brief to report on significant morbidity associated with anaesthesia.

Case Reporting

Reporting is entirely voluntary and dependent on the goodwill of Victorian anaesthetists. The Chairman of the Council also has access to Coroners files, which are public documents and the Council uses these files to gather further information, as necessary.

Sentinel Events

As of July 2001, the Department of Human Services clinical risk management strategy requires the mandatory reporting of a small number of serious adverse (sentinel) events of mortality and morbidity by public hospitals. As a result, the Council has a role in reviewing those sentinel events and their associated root cause analyses that are relevant to anaesthesia and perioperative complications.

Confidentiality and Exchange of Information

It is emphasised that, whatever the source of the data, confidentiality is maintained at all times. Only the Chairman has access to any information identifying the reporting doctor, other medical staff, the patient or the Hospital. No Council information is passed on to the State Coroner's Office or to any other individual or institution except in a most general sense when advice is sought for preventive strategies. The Consultative Council is listed as a prescribed council under the Health (Prescribed Consultative Council) Regulations 2002 and the provisions of the Health Act 1958, Section 24A apply. Thus no personal information of any sort may be released to any authority under any circumstances unless authorised by both the Minister for Health and the reporting doctor.

Within the Freedom of Information Act there is provision that access to information held by the Consultative Council would be subject to the same conditions as detailed in Section 24A of the Health Act. Because of the strict provisions for confidentiality, it is possible for the Chairman to have detailed discussions with the reporting anaesthetist on any particular adverse outcome. This is seen as very important in proper evaluation of such events.

Of note: The Health Act 1958 is currently under review. A submission regarding the Review of the Health Act 1958 was lodged in August 2005.

Council Website: www.health.vic.gov.au/vccamm

SOUTH AUSTRALIAN PERIOPERATIVE MORTALITY COMMITTEE

This Committee was established under the South Australian Health Commission Act in 1987, replacing the South Australian Anaesthetics Mortality Committee which had functioned since 1969. Because of concern about lack of legal safeguards for confidentiality of the Committee's activities, reporting to the new Committee did not commence until mid-1991.

The aims of the Perioperative Mortality Committee are:

- To review each death occurring in association with operations or procedures performed under local, regional and/or general anaesthesia from an anaesthetic, pharmacological, surgical and pathological perspective, and to collate this information.
- Similarly, to review each death occurring in association with operations or procedures performed with the assistance of sedative and/or analgesic drugs.
- To determine and monitor the epidemiology of these deaths in South Australia.
- To identify those factors which merit special study and/or action
- To provide confidential information to notifying medical practitioners upon request
- To disseminate information obtained from the Committee's research by means of reports to the South Australian Health Commission and Professional Meetings on an annual basis.
- To report to Professional Journals when sufficient significant data has been obtained to warrant such an action.
- To produce a comprehensive report at least every five years for distribution to the Medical Profession generally within South Australia

Composition

The committee consists of seven anaesthetists, one intensive care specialist, two surgeons, one pathologist, and two registered nurses specialising in Recovery Room Nursing, appointed by the Minister.

Collection of Data

Anaesthetists and surgeons in South Australia report voluntarily to the Perioperative Mortality Committee on its standard form regarding cases which fall into the definition of a death which occurs during an operation or procedure (or within 24 hours of its completion) performed with the assistance of sedative, analgesic, local or general anaesthetic drugs or any combination of these, or, a death which may be the result (either partially or totally) of an incident during or after such operation or procedure even if more than 24 hours has elapsed since its completion.

Process Of Case Review

All reports are submitted to the chairman of the committee. The chairman then gathers any further information he considers necessary from the Coroner's files, from the surgeon and anaesthetist and from hospital notes etc. When this has been completed, all means of identification are removed from the reports and additional information. Copies are then made of the "sterilised" information and together with a summary of each case, distributed to the members of the committee at least two weeks prior to the meeting at which they are to be considered. Any information which may identify any person involved in submitting the report or in the case itself is destroyed once the case has been finalised. Once the committee has classified the case, a hard copy of this is made together with a summary of the case and any pertinent comments by the committee and attached to the particular report. The classification and all data of an epidemiological nature is saved.

Legislative Privilege

This is provided by Section 64d of the South Australian Health Commission Act (1976) amended in 1989 and proclaimed in 1991.
The committee also reviews and analyses reports from the Northern Territory.

QUEENSLAND COMMITTEE TO ENQUIRE INTO PERIOPERATIVE DEATHS

This Committee has been in existence since 1975. Much preliminary work involved procedural matters during the early days. The official status of the Committee was established by order-in-Council and published in the Government Gazette of 21 February 1976 when it was made a research project under Section 154M, Part iv(c) of the Health Act under the Chairmanship of the Director-General of Health and Medical Services. The first case histories were considered by the Committee in 1977.

The following bodies nominate members to be on the Committee:

- Australian and New Zealand College of Anaesthetists
- Royal Australasian College of Surgeons
- Australian Society of Anaesthetists
- Australian Medical Association
- Royal College of Pathologists of Australasia
- Australian Dental Association
- Royal Australian and New Zealand College of Obstetricians and Gynaecologists
- Faculty of Medicine, University of Queensland
- Faculty of Dentistry, University of Queensland
- Acute Private Hospitals Association of Queensland
- Royal Australian College of General Practitioners (Queensland Faculty)

Once appointed they are members of a confidential statutory committee and do not report back to the organisation, other than on policy matters.

Establishment under Section 154M

The purpose of using Section 154M, Part iv(c) was to encourage the supply of information to the responsible investigator and to protect both the information and the source from which it came. Such information supplied to the Committee is not admissible in any proceedings without the approval of the Governor-in-Council and the persons supplying the information cannot be compelled without their consent to answer any questions concerning the information supplied.

All information is considered highly confidential and is examined by the Committee without knowledge of names of patients, doctors or hospitals.

Although the Committee had originally been established at the request of anaesthetists to look at deaths which may have been associated with anaesthesia, by 1987 it was apparent that the Committee would more appropriately be named the "Committee to Enquire into Perioperative Deaths".

THE ANAESTHETIC MORTALITY COMMITTEE OF WESTERN AUSTRALIA

The Anaesthetic Mortality Committee (AMC) of Western Australia was established in 1978 by proclamation of the Health Act Amendment Act 1978. The Committee consists of five permanent and seven provisional members. For any particular meeting, the Chairman, having regard to the cases to be discussed, invites two of the provisional members to make up, with the permanent members, a Committee of seven. In addition to the Committee, the Minister appoints a specialist anaesthetist as investigator.

Composition

The five permanent members of the Committee are:

A person nominated by the State Branch of the Australian and New Zealand College of Anaesthetists who is also Chairman of the Committee.

A medical practitioner nominated by the Executive Director of Public Health.

A specialist anaesthetist nominated by the Senate of the University of Western Australia.

A specialist anaesthetist nominated by the Australian Society of Anaesthetists.

A specialist anaesthetist nominated by the Australian Medical Association.

The seven Provisional members are:

A specialist obstetrician and gynaecologist nominated by the State Branch of the Australian Council of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists.
Two general practitioners with a special interest in anaesthesia, nominated by the State Branch of the Royal Australian College of General Practitioners.
A specialist surgeon nominated by the State Branch of the Royal Australasian College of Surgeons.
A registered midwife nominated by the State Branch of the Royal Australian Nursing Federation.
A dental practitioner nominated by the State Branch of the Australian Dental Association.
The Professor of Clinical Pharmacology of the University of Western Australia.

Reporting of Deaths Related to Anaesthesia

All deaths occurring within 48 hours of an anaesthetic or deaths where the anaesthetic is thought to have been a contributing factor must be reported to the Executive Director of Public Health.
The Executive Director of Public Health, on receipt of a report of an anaesthetic death, directs the investigator to enquire into the circumstances of the death. If the investigator finds that the death is not likely to have been due to the anaesthetic, he or she reports this to the Executive Director of Public Health, and that, as far as the AMC is concerned, is the end of the matter. If the investigator is of the opinion that the death is likely to have been due in some measure to the anaesthetic, he prepares a case report for the Chairman of the Committee.

Scope of the Investigator

The investigator receives a report from the anaesthetist concerned. It is usually possible to make a decision based on this report. If not, the investigator may request further information. This is usually in the form of the hospital file and the autopsy report, which are always made available by the relevant authorities. The investigator may also interview the anaesthetist or any other persons likely to assist in the investigation. No-one else on the Committee is entitled to communicate with any person mentioned in the investigator's report unless that person makes a request in writing.

Calling a Meeting

The Chairman, having received the reports, selects two provisional members to make up the Committee of seven. The report is then considered by the Committee, which determines the cause of death and whether the conduct of the anaesthetic played any part.

Confidentiality

The report of the investigator to the Chairman is in the form of a medical report with identification of persons and places removed. The Chairman knows the name of the anaesthetist as he or she has to write to the anaesthetist after the meeting. There are strict guidelines for dealing with the material collected by the Committee in a confidential manner. When the Committee has completed its deliberations, the material must be returned to the Executive Director of Public Health for safe custody. The reports of the investigator and the determinations of the Committee may be disseminated for educational purposes, provided that persons involved are not identifiable. The information used by the Committee and its opinions about that information are not admissible in any court of any kind, and no person furnishing information to the Committee is liable in any action for damages. The only exception to the confidentiality clauses are, the provisions of the Coroners Act whereby the adducing of evidence for a serious offence would take precedence over the confidentiality clauses of the Health Act. With this in mind, the Committee has always deferred any discussion of deaths related to anaesthesia until the Coroner has brought down his report. The Freedom of Information Act 1992 opened a way for the public to breech the confidentiality of the Committee. However, under the Health Services (Quality Improvement) Act, 1994, the AMC was exempted from the provisions of the Freedom of Information Act. The members of the Committee believe that the Acts provide watertight protection for its deliberations and those involved in them.

Website: www.ctec.uwa.edu.au/anaesthesiawa/amc1.html

APPENDIX 2

STATE CORONIAL ACTS AND THE COLLECTION OF DATA

WESTERN AUSTRALIA

Coroners Act 1996

The death occurs during or as a result of an anaesthetic (and is not due to natural causes).

Data Collection for the Anaesthetic Mortality Committee of Western Australia (AMC)

The State Executive Director of Public Health, on receipt of a report of an anaesthetic death, directs the investigator to enquire into the circumstances of the death. If the investigator is of the opinion that the death is likely to have been due in some measure to the anaesthetic, he/she prepares a case report for the Chairman of the Committee. The investigator receives a report from the anaesthetist concerned. It is usually possible to make a decision based on this report. If not, the investigator may request further information. This is usually in the form of the hospital file and the autopsy report, which are always made available by the relevant authorities.

This would appear to be the most effective means of collecting data.

NEW SOUTH WALES

Coroners Act 1980

A coroner must be notified of any death which occurs during/as a result of /within 24 hours of the administration of an anaesthetic which was given as part of a medical/surgical/dental or similar procedure (excluding a local anaesthetic employed for purposes of resuscitation.)

Data Collection for the NSW Special Committee Investigating Deaths Under Anaesthesia (SCIDUA) When a death required under the act is reported to the Coroner, the patient's name is notified to SCIDUA by arrangement with the Coroner's office. The SCIDUA secretariat then contacts the anaesthetist concerned requesting case details on the special report form.

It is believed that this State achieves a very high level of data collection.

VICTORIA

Coroners act 1985

A reportable death is one which occurs during or as a result of an anaesthetic (and is not due to natural causes).

Of note: The Health Act 1958 is currently under review. A submission regarding the Review of the Health Act 1958 was lodged in August 2005.

Data Collection for the Victorian Consultative Council on Anaesthetic Mortality and Morbidity

Reporting is entirely voluntary and dependent on the goodwill and support of Victorian anaesthetists. The Chairman also has access to the Coroner's files, which are public documents and uses these files, if possible, to gain further information directly from the anaesthetist.

SOUTH AUSTRALIA
Coroners Act 1975

There is no specific definition of a reportable death.

Data Collection for the South Australian Perioperative Mortality Committee
Anaesthetists and surgeons report voluntarily on a standard form regarding cases which fall within the following definition "a death which occurs during an operation or procedure (or within 24 hours of its completion) performed with the assistance of sedative, analgesic, local or general anaesthetic drugs or any combination of these or a death which may be the result (either totally or partially) of an incident during or after such an operation or procedure even if more than 24 hours has elapsed. This definition is almost identical to that used by the South Australian Coroner, from whom the Committee receives complete cooperation.

TASMANIA
Coroners Act 1995

A reportable death is one that occurs during or as a result of anaesthesia or sedation (and is not due to natural causes).

Data Collection for Tasmania
Data from Tasmania is collected and reviewed by the New South Wales Special Committee Investigating Deaths Under Anaesthesia.

NORTHERN TERRITORY
Coroners Act 1993

A reportable death is one that occurs during or as a result of an anaesthetic (and is not due to natural causes).

Data Collection for Northern Territory
Data from the Northern Territory is collected and reviewed by the South Australian Perioperative Mortality Committee.

AUSTRALIAN CAPITAL TERRITORY
Coroners Act 1997

A coroner has jurisdiction to hold an inquest into the manner and cause of death if the person died during/72 hours after/as a result of:

- a medical/ surgical/ dental/ or similar operation
- an invasive medical or diagnostic procedure

This section does not apply if the medical practitioner in charge of the procedure provides a certificate stating that the person's death was not the result of the procedure, and the procedure is:
a. the giving of an intravenous injection
b. the giving of an intramuscular injection
c. intravenous therapy
d. the insertion of a line or cannula
e. artificial ventilation
f. cardiac resuscitation
g. urethral catheterisation

Data Collection for Australian Capital Territory
The ACT does not have a State Mortality Committee and at present does not report cases to any other State Committee.

APPENDIX 3

ANAESTHESIA MORTALITY

GLOSSARY OF TERMS CASE CLASSIFICATION	
A. Deaths Attributable to Anaesthesia	
Category 1	Where it is reasonably certain that death was caused by the anaesthesia or other factors under the control of the anaesthetist
Category 2	Where there is some doubt whether death was entirely attributable to the anaesthesia or other factors under the control of the anaesthetist
Category 3	Where death was caused by both surgical and anaesthesia factors
Explanatory Notes • *The intention of the classification is not to apportion blame in individual cases but to establish the contribution of the anaesthesia factors to the death.* • *The above classification is applied regardless of the patient's condition before the procedure However if it is considered that the medical condition makes a substantial contribution to the anaesthesia-related death subcategory H should also be applied* • *If no factor under the control of the anaesthetists is identified which could or should have been done better subcategory G should also be applied*	
B. Deaths In Which Anaesthesia Played No Part	
Category 4	Surgical death where the administration of the anaesthesia is not contributory and surgical or other factors are implicated
Category 5	Inevitable death which would have occurred irrespective of anaesthesia or surgical procedures
Category 6	Incidental death which could not reasonably be expected to have been foreseen by those looking after the patient, was not related to the indication for surgery and was not due to factors under the control of anaesthetist or surgeon
C. Unassessable Deaths	
Category 7	Those that cannot be assessed despite considerable data but where the information is conflicting or key data is missing.
Category 8	Cases which cannot be assessed because of inadequate data.
CASUAL OR CONTRIBUTORY FACTORS IN CATEGORY A DEATH	
Note that it is common for more than one factor to be identified in the case of anaesthesia attributable death	
SUBCATEGORIES	
A. Preoperative	
(1) Assessment	This may involve failure to take an adequate history or perform an adequate examination or to undertake appropriate investigation or consultation or make adequate assessment of the volume status of the patient in an emergency. Where this is also a surgical responsibility the case may be classified in Category 3 above.
(1) Management	This may involve failure to administer appropriate therapy or resuscitation. Urgency and the responsibility of the surgeon may also modify this classification

B. Anaesthesia Technique	
(i) Choice or Application	There is inappropriate choice of technique in circumstances where it is contraindicated or by the incorrect application of a technique which was correctly chosen
(ii) Airway Maintenance Including Pulmonary Aspiration	There is inappropriate choice of artificial airway or failure to maintain or provide adequate protection of the airway or to recognise misplacement or occlusion of an artificial airway.
(iii) Ventilation	Death is caused by failure of ventilation of the lungs for any reason. This would include inadequate ventilator settings and failure to reinstitute proper respiratory support after deliberate hypoventilation (e g bypass).
(iv) Circulatory Support	Failure to provide adequate support where there is haemodynamic instability, in particular in relation to techniques involving sympathetic blockade.
C. Anaesthesia Drugs	
(i) Selection	Administration of a wrong drug or one which is contraindicated or inappropriate. This would include 'syringe swap' errors
(ii) Dosage	This may be due to incorrect dosage, absolute or relative to the patient's size, age and condition and in practice is usually an overdose
(iii) Adverse Drug Reaction	This includes all fatal drug reactions both acute such as anaphylaxis and the delayed effects of anaesthesia agents such as the volatile agents
(iv) Inadequate Reversal	This would include relaxant, narcotic and tranquillising agents where reversal was indicated
(v) Incomplete Recovery	e.g. prolonged coma
D. Anaesthesia Management	
(i) Crisis Management	Inadequate management of unexpected occurrences during anaesthesia or in other situations, which, if uncorrected, could lead to death.
(ii) Inadequate Monitoring	Failure to observe minimum standards as enunciated in the ANZCA Professional Documents or to undertake additional monitoring when indicated e.g. use of a pulmonary artery catheter in left ventricular failure.
(iii) Equipment Failure	Death as a result of failure to check equipment or due to failure of an item of anaesthesia equipment.
(iv) Inadequate Resuscitation	Failure to provide adequate resuscitation in an emergency situation
(v) Hypothermia	Failure to maintain adequate body temperature within recognised limits
E. Postoperative	
(i) Management	Death as a result of inappropriate intervention or omission of active intervention by the anaesthetist or a person under their direction (eg Recovery or pain management nurse) in some matter related to the patient's anaesthesia, pain management or resuscitation.
(ii) Supervision	Death due to inadequate supervision or monitoring The anaesthetist has ongoing responsibility but the surgical role must also be assessed
(iii) Inadequate Resuscitation	Death due to inadequate management of hypovolaemia or hypoxaemia or where there has been a failure to perform proper cardiopulmonary resuscitation
F. Organisational	
(i) Inadequate supervision, inexperience or assistance	These factors apply whether the anaesthetist is a trainee, a non-specialist or a specialist undertaking an unfamiliar procedure. The criterion of adequacy of supervision of a trainee is based on the ANZCA Professional Document on supervision of trainees.
(ii) Poor Organization of the Service	Inappropriate delegation, poor rostering and fatigue contributing to a fatality
(iii) Failure of Interdisciplinary Planning	Poor communication in peri-operative management and failure to anticipate need for high dependency care
G. No Correctable Factor Identified	
Where the death was due to anaesthesia factors but no better technique could be suggested	
H. Medical Condition of the Patient	
Where it is considered that the medical condition was a significant factor in the anaesthesia related death.	

APPENDIX 4

AMERICAN SOCIETY OF ANESTHESIOLOGISTS (ASA)

PHYSICAL STATUS CLASSIFICATION

P-1
A normal healthy patient.

P-2
A patient with mild systemic disease.

P-3
A patient with severe systemic disease.

P-4
A patient with severe systemic disease that is a constant threat to life.

P-5
A moribund patient who is not expected to survive without the operation.

P-6
A declared brain-dead patient whose organs are being removed for donor purposes.

E
Patient requires emergency procedure.

Website address – www.asahq.org/clinical/physicalstatus.htm

Excerpted from American Society of Anesthesiologists "*Manual for Anesthesia Department Organization and Management 2003-04*". A copy of the full text can be obtained from ASA, 520 N Northwest Highway, Park Ridge, Illinois 60068-2573

HISTORICAL NOTE

It is of interest that Dr Geoffrey Kaye analysed all anaesthesia-related deaths in Melbourne in 1936. He surveyed almost 500,000 operations at 14 hospitals, and found a mortality of 1:1,000.

His detailed report occupied 36 pages of the Medical Journal of Australia ('the Anaesthetic Number', June 11, 1938: 995-1031. He published also in the British Journal of Anaesthesia in 1936 (13: 110-127).

Dr Gilbert Brown subsequently reported anaesthesia-related deaths at the Royal Adelaide Hospital between 1932 and 1936. The mortality was 1.8:1,000 (Med Sci Arch 1937; 17: 3-20). 321 - 338

Acknowledgements

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Australian and New Zealand
College of Anaesthetists
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