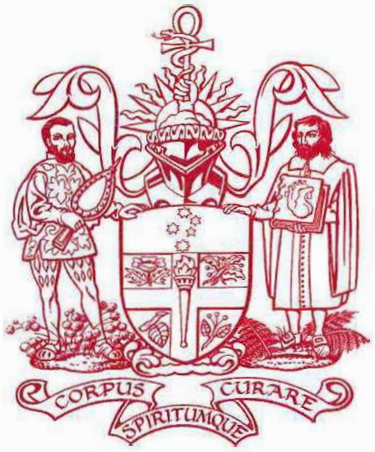

AUSTRALIAN AND NEW ZEALAND
COLLEGE OF ANAESTHETISTS
ACN 055 042 852

ANAESTHESIA RELATED MORTALITY IN AUSTRALIA

1994 – 1996

EDITOR:
N J DAVIS AM, FANZCA

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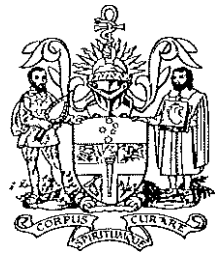

ANAESTHESIA RELATED MORTALITY IN AUSTRALIA

1994 – 1996

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

Editor:
N J Davis AM, FANZCA

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FOREWORD

Deaths associated with anaesthesia have been detailed, examined and categorised for nearly four decades in Australia. All States have Government-supported special Committees to collect data and report in considerable detail at regular intervals. This is the fourth successive national triennial report on anaesthesia-related deaths collated from all State Committees, indicating that Australia leads the world not only in this reporting, but also in demonstrating the highest quality and safety record of anaesthesia.

The format of this report is similar to those published previously and from the data presented, it is concluded that anaesthesia-related deaths have an occurrence of no more than one in approximately 63,000 operative or diagnostic procedures. Furthermore, if one examines those deaths definitely attributed to anaesthesia (not those probably attributed to anaesthesia, or jointly attributed to anaesthesia with other factors), the death rate is about one in over 150,000 procedures.

As noted above, the data in this report is received from hard-working and diligent State Committees with the co-operation of State Governments and other statutory bodies, the profession generally, both public and private healthcare institutions, and, most importantly, individual anaesthetists.

The College Committee on Anaesthetic Mortality continues to work successfully toward uniform data collection and data interpretation across all States, and is particularly grateful for the assistance of Australian Health Ministers and Coroners. It is noted that potential flaws in data collection exist in several areas, including difficulties in determining precisely the total number of anaesthetics administered as opposed to the total number of "procedures", a small proportion of which may not involve anaesthesia. Another problem area includes unreliable data on deaths associated with procedures during which some form of sedation or local anaesthesia may be administered by non-anaesthetists. While it is believed that both of these issues may not significantly affect the overall conclusions of the report, the matters should be pursued in order to provide greater accuracy of data in future reports.

Finally, it is important to note that data from this report and from previous State and National reports is a highly valuable resource. The reports are useful for the training of anaesthetists, for the continuing education and quality assurance of practising anaesthetists, and for demonstrating the factual safety and risks of anaesthesia to every member of the Australian community.

R G Walsh
President, ANZCA
Chairman, Committee on Anaesthetic Mortality

COMMITTEE

The composition of the Committee which produced this report was:

Dr Richard Walsh (Chairman)	ANZCA
Emeritus Prof Tess Cramond, AO, OBE	Queensland
A/Prof Neville Davis, AM	Western Australia
Dr Peter Gartrell	South Australia
Dr Brian Horan	New South Wales
Dr Patricia Mackay	Victoria
Mrs Carolyn Handley (Executive Officer)	ANZCA

At the time of the compilation of the 1991-1993 National Report it was agreed that a further report would be created for the period 1994-1996. The methods and source of information are as in the 1991-1993 report. The details and reporting methods of the State Committees were given in the 1991-1993 report and are not repeated here. No major changes have occurred since the last report. The report has again focussed on deaths attributable to anaesthesia *(1, 2, 3 see Table 1).*

Table 1. System of Classification of Deaths by Anaesthesia Mortality Committees

1. *Deaths attributable wholly or partly to anaesthesia*
    1. Where it is reasonably certain that death was caused by the anaesthetic or other factors under the anaesthetist's control.
    2. Where there is some doubt whether death was entirely attributable to the anaesthetic or factors under the anaesthetist's control.
    3. Where death was caused by both anaesthetic and surgical factors.
2. *Deaths in which anaesthesia played no part*
    1. Death entirely due to surgical factors
    2. Inevitable deaths in which anaesthetic and surgical management were apparently satisfactory.
    3. Fortuitous deaths*
3. *Unassessable deaths*
    1. Those which cannot be assessed despite considerable data.
    2. Those which cannot be assessed on account of inadequacy of data.

* *A death was classified as fortuitous when the cause 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.*

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

Data collection

The template as used in the 1991-93 report was used by the Chair of each Committee.

System of classification

The method is shown in Table 1. The term "death attributable to anaesthesia" is defined in Table 1 –1, 2, 3.

FINDINGS

Number of deaths classified

The total number of deaths classified by the five Committees during the triennium was 1875.

Table 2. Number of deaths classified by each Committee and numbers considered to be related to Anaesthesia

	Classified	Definite	Probable	Jointly	Total Related to Anaesthesia
NSW & TAS	943	15	16	31	62
VIC	261	18	12	5	35
SA & NT	165	5	4	1	10
WA	405	14	3	2	19
QLD	101	3	1	5	9
Total	**1875**	**55**	**36**	**44**	**135**

No deaths that occurred during the period were still under consideration at the time of the report.

Subtle differences in the workings of the Committees are probably the reason for differing figures for various States. The notable figure is the large number of classified deaths in Western Australia – this is due to the legal requirement in WA for all deaths that occur within 48 hours of anaesthesia to be reported. The majority of these are not considered to be attributable to anaesthesia.

Numbers 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 is some measure of the efficiency of reporting.

Table 3. Number of deaths considered related to population

	VIC	WA	QLD	NSW & TAS	SA & NT
Population *(x million)**	4.37	1.70	3.37	6.50	1.62
No. of deaths considered	261	405	101	943	165
No. considered per million	60	238	30	145	102

* *Population source – 1996 Census – Australian Bureau of Statistics*

Table 4. Total number of deaths considered by all Committees related to the population of Australia (excluding ACT) at 1996 Census

Population served *(x million)**	17.56
Number of deaths considered	1,875
Number considered per million	106.8

* *Population source – 1996 Census – Australian Bureau of Statistics*

Numbers of deaths attributable to anaesthesia related to population and to numbers considered.

Table 5. Number of deaths during the triennium which were attributed to anaesthesia, related to the population and to the number of deaths considered.

No. of deaths attributed to anaesthesia	135
No. of deaths attributed to anaesthesia per million population	7.69
No. of deaths attributed to anaesthesia per 100 considered	7.20

It can be seen that approximately 7% of the deaths considered were attributed to anaesthesia in some way and the other 93% were due to other causes.

Causal or contributory factors in anaesthesia-attributed deaths

The findings as to which aspect of anaesthetic management led or contributed to death are shown in Table 6. As stated in the 1991-93 report, there was difficulty in classifying certain deaths. This resulted in the addition of subgroup G, where the anaesthetic was deemed to have caused the patient's death but no correctable factor could be identified and the Mortality Committee concerned could not suggest any alternative technique The implication is that the underlying state of health was the major factor in the death, although death would not have occurred at that time if an anaesthetic had not been administered.

The classification is again under review

Table 6. Causal or contributory factors in anaesthesia-attributable deaths

	NSW & TAS	VIC	SA & NT	WA	QLD	Total
A. PREOPERATIVE	27	13	1	3	9	**53**
i. assessment	22	10	1	2	5	**40**
ii. management	5	3	0	1	4	**13**
B. ANAESTHETIC TECHNIQUE	23	33	9	6	2	**73**
i. technique *(not ii or iii)*	20	18	5	3	2	**48**
ii. ventilation	2	4	1	2	0	**9**
iii airway maintenance	1	11	3	1	0	**16**
C. ANAESTHETIC DRUGS	30	16	4	10	8	**68**
i. selection	1	12	1	2	2	**18**
ii. dosage	26	4	3	6	6	**45**
iii. adverse drug reaction	1	0	0	1	0	**2**
iv. incomplete reversal or recovery	2	0	0	1	0	**3**
D. ANAESTHETIC MANAGEMENT	20	12	1	2	1	**36**
i. crisis management	14	5	0	2	0	**21**
ii. inadequate monitoring	6	4	1	0	1	**12**
iii. equipment failure	0	3	0	0	0	**3**
E. POST OPERATIVE	12	3	4	2	0	**21**
i. management	6	0	2	2	0	**10**
ii. supervision or monitoring	6	2	2	0	0	**10**
iii inadequate resuscitation	0	1	0	0	0	**1**
F. OTHER	14	29	2	4	2	**51**
i inexperience/inadequate supervision or assistance	11	6	0	1	1	**19**
ii organisational problems	3	6	0	1	1	**11**
iii. other (specify)	0	17‡	2*	2†	0	**21**
G. NO CORRECTABLE FACTOR IDENTIFIED	6	3	0	8	0	**17**

* Inadequate communication.

† These two cases were both pulmonary artery branch rupture due to pulmonary artery catheters.

‡ 16 of these cases were deaths in patients in poor medical condition, but the deaths were considered attributable to anaesthesia One was due to pulmonary artery branch rupture due to pulmonary artery catheter

Gender

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

Table 7. Gender distribution of deceased in anaesthesia-attributable deaths

	Male	Female
NSW & TAS	37	25
VIC	15	20
SA & NT	6	4
WA	13	6
QLD	6	3
Total	77	58

Age

The age in decades is shown in Table 8. The first year of life if shown as a separate column.

Table 8. Age Distribution

	0-1	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	90+
NSW & TAS	0	1	1	0	0	1	1	16	23	15	4
VIC	0	1	0	0	0	3	2	9	10	5	5
SA & NT	0	1	0	1	0	2	0	3	1	2	0
WA	0	0	0	1	0	2	0	3	5	5	3
QLD	0	0	0	0	0	0	1	1	5	2	0
Total	0	3	1	2	0	8	4	32	44	29	12

As in the previous reports the majority of deaths are in the older age group. It is noteworthy that there are only four deaths in the first two decades.

Degree of Urgency

A three-part scale of urgency is used. ***Emergency*** is an operation that requires to be performed as soon as possible. ***Urgent*** denotes a lesser degree of urgency where time is available to improve the patient's condition and the time of the operation can be set with some convenience in terms of staffing. ***Scheduled*** indicates that the case was booked at least 24 hours in advance.

Table 9. Degree of urgency of the operations

	Scheduled	Urgent	Emergency
NSW & TAS	16	15	31
VIC	15	6	14
SA & NT	4	2	4
WA	6	8	5
QLD	3	3	3
Total	44	34	57

There is some doubt as to the value of these figures as there is subjective discrimination of the degree of urgency.

Type of Hospital

Table 10 shows the distribution between various types of hospital There is some variation in hospital types in different States and definition of teaching hospital has been reserved for the major institutions with post-graduate training programs as well as undergraduate teaching.

Table 10. Type of Hospital

	Metropolitan Public Teaching	Metropolitan Public Non-Teaching	Rural Base	Rural Public Other	Private
NSW & TAS	28	8	8	3	15
VIC	21	0	3	0	11
SA & NT	5	5	0	0	0
WA	16	0	0	0	3
QLD	4	5	0	0	0
Total	74	18	11	3	29

As in previous reports the majority of cases are in metropolitan teaching hospitals. This reflects the practice of those hospitals, treating the sickest patients and performing the most complex surgery.

Level of risk

With the exception of New South Wales, the 5-point classification of the American Society of Anesthesiologists *(ASA scale)* is used. NSW uses a 4-point scale.

Table 11. Level of risk of the patients by the ASA Scale

	ASA1	ASA2	ASA3	ASA4	ASA5
NSW & TAS	0	9	29	20	4
VIC	0	1	18	14	2
SA & NT	0	3	4	1	2
WA	0	0	9	7	3
QLD	0	0	6	3	0
Total	0	13	66	45	11

For future reports, all Committees will use ASA Status. Even with that classification there is some scope for subjective decision on the ASA Scale.

Grade of anaesthetist

Table 12 shows the grade of the anaesthetist Where the principal anaesthetist, who has submitted the report is a specialist, the report normally lists the anaesthetist as a specialist even though a supervised trainee may be involved.

Table 12. Grade of anaesthetist

	Specialist	Non-Specialist	Trainee/Registrar	Other
NSW & TAS	44	2	12	4
VIC	26	1	8	–
SA & NT	6	0	4	–
WA	13	0	6*	–
QLD	8	0	1	–
Total	97	3	31	4

* *One of these cases was a resident medical officer doing a 3-month term. It has been included as trainee anaesthetist as the incident was aspiration while the resident was attempting intubation (under direct supervision by a specialist anaesthetist).*

It is noteworthy that there were no deaths where the anaesthetist was the operator, or where the anaesthetist was not a medical practitioner. It has been noted in previous reports that deaths which occur with "operator anaesthetists" during endoscopies and other procedures are not usually referred to Anaesthetic Mortality Committees.

Types of surgery

Table 13 depicts types of surgery in 12 categories.

Table 13. Types of Surgery

	Abdominal	Cardio-thoracic	Vascular	Neurosurgery	Orthopaedic	Endoscopy	Urology	General non-abdominal	Gynaecology	ENT/Head and Neck	Eye	Other
NSW & TAS	15	7	9	0	11	11	2	1	1	1	0	4
VIC	3	5	5	0	10	6	4	1	0	0	0	1
SA & NT	3	0	0	0	2	3	0	2	0	0	0	0
WA	3	4	2	0	9	0	0	0	1	0	0	0
QLD	3	0	0	0	3	0	2	0	0	0	0	1
Total	27	16	16	0	35	20	8	4	2	1	0	6

Number of anaesthetics administered annually

Data on the number of anaesthetics administered is not collected in any State. However, as in the 1991-93 report, we have been provided with figures from the Australian Institute of Health and Welfare. The figures are not strictly for anaesthetics as they include operations performed under local infiltration or no anaesthesia. However, they do give an indication of the number of procedures.

The figures come from the separations from public and private hospitals. We have used the year 1995-96.

Table 14. Estimate of number of procedures during the year 1995-96

NSW	VIC	QLD	WA	SA	TAS	ACT	NT*	Total
1,007,301	665,270	538,762	209,959	264,246	74,464	51,501	27,309	2,838,812

* *Information from NT private hospitals was not available.*

It is hoped that the Institute of Health and Welfare will, in the future, collect figures for numbers of anaesthetics administered.

Conclusions

1. There were 135 deaths considered attributable partly or wholly to anaesthesia. The number of procedures for the triennium *(using 1995-6 as typical)* is approximately 8,500,000. This gives a figure in the order of one death per 63,000 procedures.
2. There were only four deaths attributed to anaesthesia in the 0-20 age group, and only one in a parturient woman.
3. As in the previous report, usually more than one anaesthetic factor was identified when a death was attributed to factors under the control of the anaesthetist The average was 2.1.
4. The anaesthetic factors most frequently identified were, anaesthetic technique *(48)*, drug overdose *(45)* and inadequate pre-operative assessment *(40)*
5. As in the previous report, airway *(16)* and ventilation problems *(9)* are infrequent.
6. Failure of equipment was identified in only three deaths. There were none in the previous report. There were five deaths attributed to the use of pulmonary artery catheters.
7. There were no deaths reported when there was an "operator – anaesthetist". It is the view of the working party that this is due to the failure to report endoscopic and single operator events. As stated in the previous report, the practice of a single doctor administering the anaesthetic and performing the procedure is unacceptable
8. Inadequate supervision or assistance is identified in 19 of the deaths attributable to anaesthesia. This is an area that must be addressed.

Recommendations

On the information received for the preparation of this report, the ANZCA Committee on Anaesthetic Mortality makes the following recommendations:

1. That all States and Territories introduce mechanisms to record the numbers of general and regional anaesthetics administered, the number of procedures performed under local anaesthesia, and the number of diagnostic and therapeutic procedures performed under sedation *(as recommended in the previous report)*
2. That the legislation in all States and Territories determining the reporting of deaths associated with anaesthesia should be made uniform *(as recommended in the previous report).*
3. That a national system be developed to consider peri-operative deaths from causes other than anaesthesia All State Committees have considered cases that warrant investigation by Peri-operative Mortality Committees with a brief wider than those currently held by Anaesthesia Mortality Committees. Only 7% of deaths considered in the triennium were attributed to anaesthesia.
4. That clinicians making a decision whether or not to undertake surgery in moribund patients should give greater consideration to who will die whether or not an operation is performed.
5. That increased emphasis be given during the training and continuing medical education of anaesthetists to the importance of pre-operative assessment and management. With increased day of surgery admissions and day surgery, it is imperative that due care is given to appropriately timed preoperative assessment.

Acknowledgments

The members of the Working Party wish to record their gratitude to members of the State Mortality Committees. The assistance of Ms Jenny Hargreaves, Head, Patient Mortality and Services Unit, Australian Institute of Health and Welfare, Canberra for providing statistical data is gratefully acknowledged.

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