



CLINICAL  
EXCELLENCE  
COMMISSION

Activities of the Special Committee  
Investigating Deaths Under Anaesthesia,  
2016

Special Report

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ACTIVITIES OF THE  
SPECIAL COMMITTEE  
INVESTIGATING DEATHS  
UNDER ANAESTHESIA, 2016

Special Report

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## Foreword

Anaesthesia is very safe in Australia. It is extremely rare for a previously fit and healthy patient to come to harm while undergoing anaesthesia or sedation. In NSW, more than one million individual episodes of anaesthesia care are recorded annually in all public and private hospitals. Modern anaesthetic techniques have made much of today's surgery possible and brought great benefits to patient safety. The reporting of anaesthesia-related deaths has helped ensure the high quality and safety of anaesthetic administration.

In 2002, Lagasse published a review *Anesthesia safety: Model or Myth?: A review of the published literature and analysis of current original data*<sup>a</sup> in which he highlighted the fact that it is almost impossible to compare anaesthetic mortality between different studies due to widely differing methodologies and definitions. He concluded that we must “dispel the myth that anesthesia-related mortality has improved by an order of magnitude”. He continued by saying that “we need to standardize our methodology of data collection and analysis so that we can share data worldwide.”

The NSW Special Committee Investigating Deaths Under Anaesthesia has been reviewing deaths since 1960, and its methods and analysis have evolved slowly in time with the changes in reporting legislation, the change in membership and the slight variations in the system of classification. However, the focus has always been on peer review of the events leading to the death while looking at the factors that might have affected the outcome. What we are sure about is that anaesthesia-related deaths are at least stable, or actually falling in NSW, while we operate on many patients with increasingly significant disease factors and continuing poor underlying health.

In this report, the Committee shares its findings on anaesthesia- and sedation-related deaths that occurred in NSW in 2016. It provides the evidence for demonstrating the safety and risk of anaesthesia.



**David Pickford**  
Chair, SCIDUA

a. Lagasse RS: Anesthesia Safety: Model or myth?: A review of the published literature and analysis of current original data, *Anesthesiology* 12, 2002, Vol.97, 1609-1617

## SCIDUA membership, 2016

- Dr David Pickford, Chair
- Dr Michele O'Brien, Deputy Chair & Medical Secretary
- Dr Damien Boyd
- Dr Matthew Crawford
- Dr Carl D'Souza
- Ms Carrie Marr – Ex-officio
- Dr Elizabeth O'Hare
- Dr Benjamin Olesnicky
- Dr Frances Smith

# Executive Summary

The Special Committee Investigating Deaths Under Anaesthesia (SCIDUA) has been reviewing anaesthesia-related deaths since 1960. It is the longest-serving committee of its type in the world. Because sedation and anaesthesia exist on a continuum of a decreased level of consciousness and use the same or similar drugs, the Committee also reviews sedation-related deaths in NSW.

In NSW the mandatory requirement to notify a death arising after anaesthesia or sedation, for an operation or a procedure, is stipulated in section 84 of the *Public Health Act 2010*. We currently do not have available a method to verify whether all anaesthesia and/or sedation deaths are reported under that provision, but we have an ongoing commitment to remind and encourage medical practitioners to report these deaths. The Committee is confident that the data contains a representative sample of deaths in NSW. Other reporting sources within the Clinical Excellence Commission (CEC) have helped ensure that major cases are not missed. Our data also indicates a good response rate from anaesthetists in providing further details of their notified cases, with 69 per cent of questionnaires requested in 2016 completed and returned to the Committee.

In 2016 the Committee reviewed 367 cases where death had occurred during, due to, or within 24 hours of an anaesthetic or administration of sedative drugs for medical procedures. Of these, 279 fell within the terms of reference of the Committee and were then classified.

In 43 cases the death was wholly or partly related to anaesthetic factors. A summary follows:

- The anaesthetic either directly caused, or substantially contributed to, the patient's death in 10 cases (Category 1 and 2<sup>1</sup>)
- Anaesthetic and surgical factors contributed to the patient's death in the remaining 33 cases
- The majority of the patients were elderly, with 79 per cent (n=34) older than 65 years and 56 per cent (n=24) older than 80 years
- Almost two thirds (62%, n=27) were ASA<sup>2</sup> grade 4, i.e., critically unwell. Nearly all cases (95%, n=41) were ASA grade 3, or 4 i.e., had significant or life-threatening intercurrent illness<sup>3</sup>
- Notably, in 74 per cent (n=32) of cases, no correctable anaesthetic factor could be identified. Undergoing surgery still poses a risk to patients despite advances in anaesthetic drugs, monitoring and techniques

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<sup>1</sup>Classification of Anaesthetic Mortality (see Appendix B).

<sup>2</sup>The American Society of Anesthesiologists (ASA) physical status rating grades patients according to their health (see Appendix C).

<sup>3</sup>Intercurrent disease occurs at same time and may impact on other disease processes.

Correctable anaesthetic factors were seen in 26 per cent (n=11) of cases. The most common factors were:

- Problems with airway maintenance (45%)
- Inadequate pre-operative assessment (45%)
- Inappropriate drug dosage (36%)
- Poor planning (36%).

These findings should be viewed in light of the retrospective nature of the Committee's deliberations.

In June 2016, the average estimated resident population in NSW, as reported by the Australian Bureau of Statistics, was about 7.73 million<sup>4</sup>. Using this figure, the estimated anaesthesia-related mortality rate was approximately six deaths per million population per annum. The estimated mortality directly caused by the anaesthetic was 1.3 deaths per million population per annum.

There were approximately 1.30 million individual episodes of anaesthesia care recorded at all public and private hospitals in NSW during 2016<sup>5</sup>. Using this figure, the estimated anaesthesia-related mortality was 1:30,000 procedures and the estimated mortality directly caused by anaesthesia was 1:130,000 procedures.

The Committee reviews anaesthetic deaths to look for management choices that it considers could be improved. These are called correctable anaesthetic factors. The estimated mortality of anaesthetic deaths with correctable factors for 2016 was 1:118,000 procedures.

The vast majority of patients who die with anaesthetic-related factors are elderly and frail, and/or have a significant life-threatening illness. The Committee views these not as unexpected deaths, but the current classification does not highlight this fact. In contrast, the NSW Coroner's Act 2009 actually only reviews medical deaths where they are "not the reasonably expected outcome of a health-related procedure". Nevertheless, the Committee feels it is necessary to continue reviewing all deaths to increase our understanding of the interaction of anaesthesia with illness and to assess what improvements can be made in the delivery of health care in NSW.

It is increasingly rare to review a case where a previously healthy patient dies from anaesthesia administration. When this does occur, the Committee, and indeed the Coroner, reviews the case to understand why this has happened in an effort to prevent this happening in the future.

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<sup>4</sup> Australian Bureau of Statistics, 2016, *Australian Demographic Statistics*, 'Table 4. Estimated Resident Population, States and Territories (Number)', time series spreadsheet, cat. no. 3101.0, viewed 16 February 2017, <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Jun%202015?OpenDocument>.

<sup>5</sup> This figure was obtained from the Performance Analysis and Reporting Branch, NSW Ministry of Health. It included cerebral anaesthesia, conduction anaesthesia and analgesia and anaesthesia during labour and delivery procedure. A coding hierarchy was used to ensure that only one anaesthesia item number was counted per episode of anaesthesia care.

## 1. SCIDUA

The Special Committee Investigating Deaths Under Anaesthesia (SCIDUA) is an expert committee appointed by the Minister for Health and has been in operation since 1960. Its current terms of reference are:

*‘to subject all deaths which occur while under, as a result of, or within 24 hours after the administration of anaesthesia or sedation for procedures of a medical, surgical, dental or investigative nature to peer review so as to identify any area of clinical management where alternative methods could have led to a more favourable result’*

The Minister appoints members to the Committee for a fixed term of five years, after which the Committee advises the Minister whether re-appointment is appropriate. In the event of a loss of a member by resignation or other reason, the Committee may recommend a suitable replacement to the Minister. The Minister may also appoint a member who is a representative of the Ministry of Health or the Clinical Excellence Commission. The Committee elects its own chairperson, who must be a currently practising anaesthetist.

The Committee has anaesthetists from a broad range of clinical specialties and professional organisations. Nominations for membership come from the Australian and New Zealand College of Anaesthetists (ANZCA), the Australian Society of Anaesthetists and academic departments of anaesthetics.

## 2. Reporting deaths to SCIDUA

The notification of deaths arising after anaesthesia or sedation for operations or procedures is a mandatory requirement in NSW, regardless of whether it is a Coroner’s case or not. This still causes some confusion because until 2009 reporting was stipulated within the *Coroner’s Act 1980*.

Reporting to SCIDUA is required under section 84 of the *Public Health Act 2010* and applies:

*‘if a patient or former patient dies while under, or as a result of, or within 24 hours after, the administration of an anaesthetic or a sedative drug administered in the course of a medical, surgical or dental operation or procedure or other health operation or procedure (other than a local anaesthetic or sedative drug administered solely for the purpose of facilitating a procedure for resuscitation from apparent or impending death).’*

Health practitioners are required to notify the death by completing the State Form (SMR010.511): *Report of death associated with anaesthesia/sedation* (Appendix A). This can be ordered online from Stream Solutions ([www.tollstreamdirect.com](http://www.tollstreamdirect.com)).

It can also be downloaded at [www.cec.health.nsw.gov.au](http://www.cec.health.nsw.gov.au).

Cases may also be referred to SCIDUA by the Patient Safety Team at the CEC if there is concern that anaesthesia may have been a factor in a patient’s death.

### 3. Legislative protection and confidentiality

SCIDUA has special privilege under section 23 of the Health Administration Act 1982 (NSW). This legislation makes it an offence for a person who obtains information in connection with the work of the Committee to:

- disclose the information
- answer any questions or produce any documents relating to the information in any proceedings.

Confidentiality of all communications between the reporting anaesthetist and the Committee is paramount. Information can only be released with the consent of the person who provided the information, or the approval of the NSW Minister for Health.

### 4. Reporting

SCIDUA communicates with its key stakeholders as follows:

- Each individual anaesthetist who provides information to the Committee receives a letter from the chairperson explaining the reasons behind the Committee's views on his or her case
- A special report for the preceding calendar year is provided to the Minister
- The Committee provides data to the ANZCA Mortality Sub-committee, which produces the triennial report of 'Safety of Anaesthesia: A review of anaesthesia-related mortality reporting in Australia and New Zealand'
- Periodically, the Committee submits reports to peer-reviewed journals, in which trends in anaesthesia-related mortality are described. These reach a wide range of anaesthetists in Australia, New Zealand and internationally.

### 5. Why this is important

Anaesthesia is not a medical therapy in itself, but is performed so that a medical or surgical procedure can be performed. Ideally, there would be no adverse outcomes from the anaesthetic. Unfortunately this is an unrealistic expectation since we know that all current anaesthetic and sedative drugs are either cardiovascular and/or respiratory depressants and their administration is subject to human error. Additionally, the specialised equipment and monitors that are used may be subject to faults and/or incorrect use.

Anaesthetists monitor, interpret and react to changes in the patient's condition. These changes could be due to the underlying disease process, the patient's intercurrent diseases, interactions or reactions to drugs, or due to the surgical/medical procedure taking place and its complications.

It is important to look for emerging trends, because anaesthetic, surgical and medical interventions change with time. It is also important to monitor anaesthetic outcomes and look for ways to reduce any adverse events.

## 6. Process

All reported deaths are reviewed by the triage sub-committee, which can either classify the death as due to factors not falling under the control of the health practitioner, or request further information from the reporting health practitioner using an additional SCIDUA questionnaire.

The questionnaire is always sent if there is any suspicion the anaesthetic or sedation was involved, or if the patient died during the procedure or in the recovery period. A questionnaire is also sent when there is a paucity of information on the initial notification form by the anaesthetist. The medical practitioner may wish to make further confidential information available to the Committee that was not available in the patient's medical record.

When questionnaires are returned, all information is de-identified and distributed to members of the Committee prior to its meetings for review. Cases are discussed at each meeting and classified. A confidential reply by the Chair is sent to the health practitioner explaining the Committee's decision.

The Committee manages its data in a secure Microsoft Access 2010/SQL server relational database. It stores data on patients and anaesthetists, as well as that collected from the form of notification, questionnaire and triage sub-committee and committee meetings. SCIDUA's data analyst is responsible for data management, ensuring accurate reporting, interpretation and verification of anaesthesia-related death data.

## 7. System of classification

Cases are classified using a system agreed upon by the ANZCA Anaesthesia Mortality Sub-committee in 2006. The full system of classification may be seen in Appendix B at the end of this report.

Group A contains deaths where anaesthetic factors are thought to have played a role.

There are three categories:

- Category 1 - deaths primarily due to anaesthetic factors;
- Category 2 - deaths where anaesthetic factors may have played some role;
- Category 3 - deaths where both surgery and anaesthetic factors were thought to have contributed.

Group B contains deaths where anaesthesia is thought to have played no part. There are three categories:

- Category 4 - surgical deaths;
- Category 5 - inevitable deaths (with or without surgery);
- Category 6 - incidental deaths, where the cause was unrelated to the surgery or anaesthetic.

Group C contains deaths where the factors involved in the patient's death are not fully assessable.

There are two categories:

- Category 7 is used when the committee has considerable data, but is unable to find out the actual cause of death;
- Category 8 is used for cases in which the available data is inadequate.

The Committee agrees that this classification system has its limitations. In many cases the patient's disease or condition is the main contributing factor to the patient's death, as we now operate on older and sicker patients. For some deaths the surgical intervention may be the precipitating factor that leads to the death, but it is often difficult to dissociate the effects of the anaesthetic and the anaesthetist's response to this critical incident as contributing factors. This has led to many cases being classified as Category 3GH (the anaesthetic, surgery and significantly the patient's own serious medical condition were factors that contributed to the death, but the Committee was satisfied with the anaesthetic and surgical management).

## 8. Results

### 8.1 Committee activities

**Table 1: Cases reviewed and classified by SCIDUA in 2016**

Meeting no.	Reviewed	Classified	More information
512	11	11	
513	11	10	1
514	14	12	2
515	13	13	-
516	8	8	-
517	15*	14	-

\* The number of cases reviewed by the committee include some that were excluded because they did not fall within the terms of reference.

**Table 2: Cases reviewed and classified by triage sub-committee in 2016**

Triage no.	Reviewed	Classified	More information
116	32	22	10
117	34**	19	13
118	39**	27	6
119	42**	34	6
120	65**	43	13
121	37	27	10
122	46**	39	2

\*\* The number of cases reviewed by the triage sub-committee include some that were excluded because they did not fall within the terms of reference and those referred to the committee directly from triage.

**Table 3: Summary of committee activities in 2016**

	<b>No. of cases</b>
Reviewed by triage	295
Reviewed by the committee	72
<b>Total cases reviewed</b>	<b>367</b>
Classified by triage	211
Classified by the committee	68
<b>Total cases classified</b>	<b>279</b>

The Committee met six times in 2016 and, together with the triage sub-committee, reviewed 367 cases. As has been noted in some past reports, not all deaths occurred in the reporting year, but are reviewed as soon as possible after the information was made available to the Committee. Therefore, the deaths occurred in the majority, for the reporting year and the preceding year, similar to previous reports.

Some cases do not fall within the terms of reference – usually because the patient died more than 24 hours after the operation and anaesthesia was not thought to be implicated in any way. These are excluded from further study. In total, 279 cases were classified using the system described above.

## 8.2 Committee findings

**Table 4: Classification of cases reviewed in 2016**

<b>Death Type</b>	<b>Category</b>	<b>No. of Cases</b>
Deaths attributable to anaesthesia	1 & 2*	10
	3	33
Deaths in which anaesthesia played no part	4	26
	5	202
	6	3
Un-assessable deaths	7 & 8*	5
	<b>Total</b>	<b>279</b>

\* Aggregated data is reported, due to small numbers in at least one of the categories (n≤5)

## 8.3 Anaesthesia-related deaths

The cases of greatest interest to the Committee are those where anaesthetic factors are thought to be the main contribution to the death (Categories 1 and 2), “primary anaesthetic deaths”, and those where both anaesthetic and surgical factors are involved (Category 3). There were 43 anaesthesia-related deaths classified in 2016.

Table 5 shows the list of factors identified in anaesthesia-related deaths in 2016.

It is important to realise that there are two sub-sets of anaesthesia-related death - those in which the anaesthetic management could have been improved with possibly a better outcome, and those in which the Committee could not suggest any way in which alternative management could have averted the fatal outcome.

**Table 5: Factors identified in anaesthesia-related deaths, 2016 (n=43)**

<b>Causal or contributory factors</b>	<b>Frequency count</b>
<b>A Pre-operative</b>	
Ai Assessment	5
Aii Management	-
<b>B Anaesthetic technique</b>	
Bi Choice or application	2
Bii Airway maintenance	5
Biii Ventilation	-
Biv Circulatory support	-
<b>C Anaesthesia drugs</b>	
Ci Selection	1
Cii Dosage	4
Ciii Adverse event	2
Civ Incomplete recovery	-
Cv Inadequate recovery	-
<b>D Anaesthetic management</b>	
Di Crisis management	-
Dii Inadequate monitoring	2
Diii Equipment failure	-
Div Inadequate resuscitation	1
Dv Hypothermia	-
<b>E Post-operative</b>	
Ei Management	1
Eii Supervision	1
Eiii Inadequate resuscitation	1
<b>F Organisational</b>	
Fi Inadequate supervision or assistance	-
Fii Poor organisation	1
Fiii Poor planning	4
<b>G No correctable factor</b>	32
<b>H Medical condition of patient a significant factor</b>	37

The frequency counts add up to more than 43, because some anaesthesia-related deaths have more than one factor identified.

### **8.3.1 No correctable factor identified**

For thirty-two (74%) deaths attributable to anaesthesia, the Committee felt that anaesthetic, surgical and/or the patient's own serious medical condition were factors that contributed to the death. For these cases the Committee was satisfied with the anaesthetic management, but it is a reminder that surgery and anaesthesia are not without risk. It is encouraging to see such a high percentage of cases falling into this category, as it infers an extremely high level of care being delivered by anaesthetists in NSW.

### **8.3.2 Anaesthesia-related with correctable factors**

The Committee classified eleven cases (26%) as having correctable factors in the anaesthetic management. For some deaths multiple factors were ascribed. The most frequently identified were:

- inadequate airway maintenance (n=5)
- inadequate pre-operative assessment (n=5)
- inappropriate drug dosage (n=4)
- poor planning (n=4)
- inappropriate choice or application of anaesthetic technique (n=2)
- adverse event (n=2)
- inadequate monitoring (n=2)
- inappropriate selection of anaesthetic drugs (n=1)
- inadequate anaesthetic management of resuscitation (n=1)
- inadequate post-operative management (n=1)
- inadequate post-operative supervision (n=1)
- inadequate post-operative resuscitation (n=1)
- poor organisation (n=1).

#### ***8.3.2.1 Inadequate airway maintenance***

The Committee identified five cases where adequacy of airway maintenance was considered a factor in the patient's death. There were three cases of peri-operative aspiration:

- In two cases an appropriate rapid sequence induction was not used when it was indicated
- In one patient with multiple co-morbidities, the event was unanticipated

In two cases probable severe hypoventilation was not recognised despite end-tidal CO<sub>2</sub> monitoring.

#### ***8.3.2.2 Inadequate pre-operative assessment***

The Committee identified five cases where inadequate pre-operative assessment was considered a factor in the patient's death.

Better assessment may have led to changes in the anaesthetic technique (including choice of airway), the dosage of drugs used and the use of invasive monitoring to detect and manage the deterioration in the patient's condition at an earlier stage.

### **8.3.2.3 Anaesthetic drug dosage**

The Committee identified four cases where the dosage of anaesthetic drugs was considered a factor in the patient's death.

Inappropriate drug dosages and/or drug combinations continue to be used in patients where their age and medical condition should alert practitioners to use caution.

A combination of primary human error and secondary system failure resulted in an unintentional overdose being given in another case.

### **8.3.2.4 Poor planning**

The Committee identified four cases where poor planning was considered a factor in the patient's death. Not all patients are suitable for procedures at all facilities.

Failure to anticipate the need to have a higher level of post-operative care led to patients having surgery in institutions where appropriate back-up facilities were not present or high dependency beds were not available.

### **8.3.2.5 Anaesthetic technique**

The Committee identified two cases where the choice or application of anaesthetic technique was considered a factor in the patient's death.

Alternative management might have avoided the poor outcomes related to airway maintenance and the dosage of drugs given during the procedure. In both cases, using appropriate invasive monitoring might have helped detect and guide management of cardiovascular instability in known critically unwell patients.

### **8.3.2.6 Adverse event**

The Committee identified two cases where an adverse event was considered a factor in the patient's death.

There was one case of presumed anaphylaxis where the trigger was either the skin preparation solution, the muscle relaxant or antibiotic. The other death seemed likely to be due to a known side effect of an appropriately selected drug.

### **8.3.2.7 Inadequate monitoring**

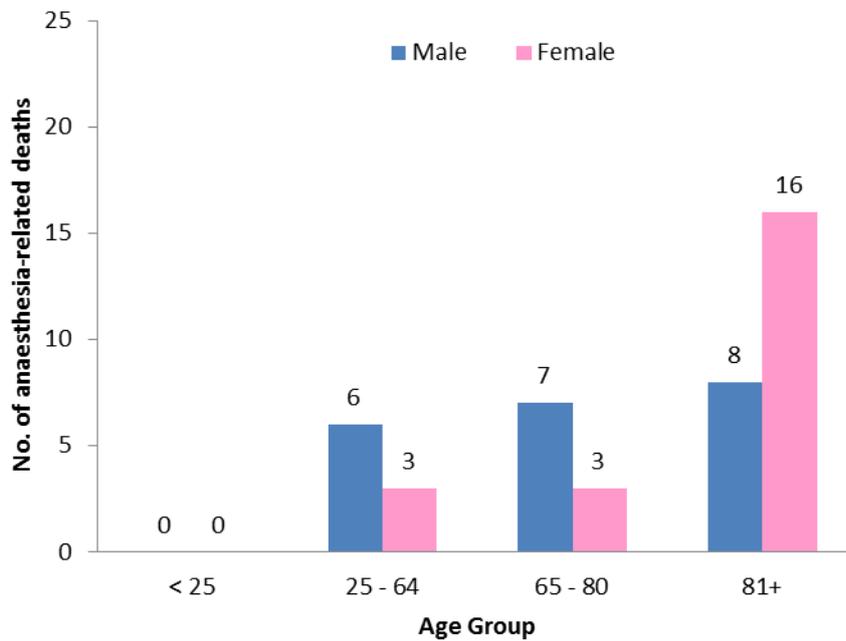
The Committee identified two cases where inadequate monitoring was considered a factor in the patient's death, as mentioned above in anaesthetic technique.

Critically unwell patients, those with cardiac conditions or patients having complex procedures with anticipated blood loss are sometimes noted to have no invasive arterial monitoring. This usually delayed the detection and appropriate management of haemodynamic instability.

## 8.4 Description of anaesthesia-related deaths

### 8.4.1 Age and sex

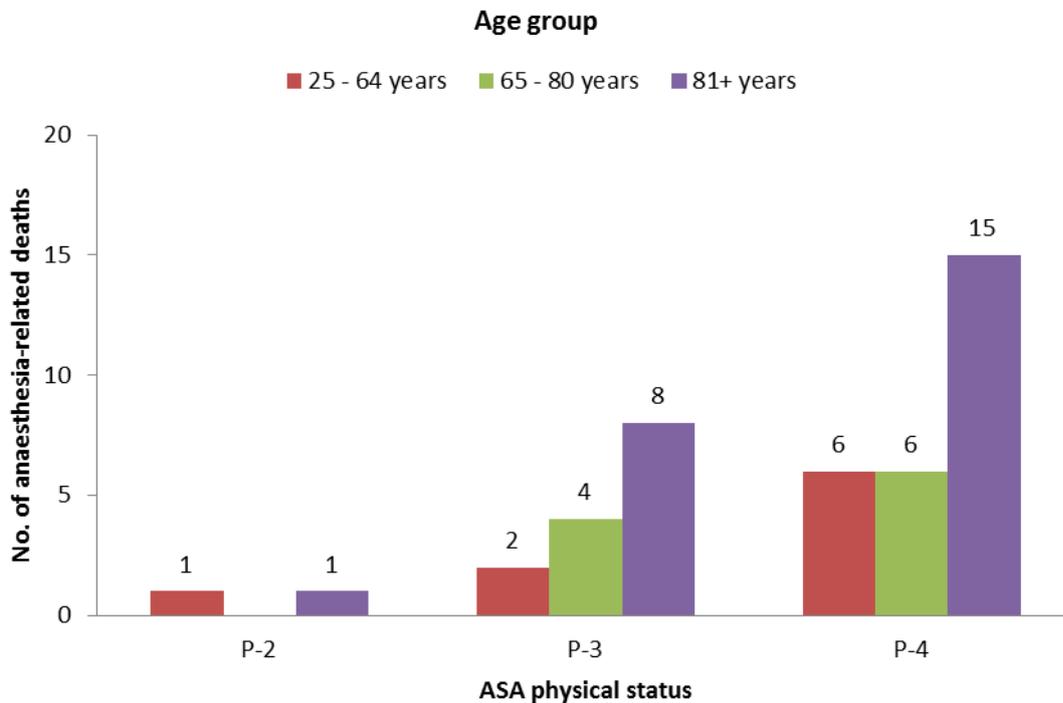
Figure 1: Age and sex distribution in anaesthesia-related deaths, 2016 (n=43)



- There were slightly more females (51%) than males (49%) in anaesthesia-related deaths
- Most patients (79%, n=34) were aged 65 and over, with more than half aged over 80 (56%, n=24)
- The median age of patients was 82.4 years (range: 50 years – 97 years)

## 8.4.2 ASA physical status<sup>6</sup>

Figure 2: Age and ASA distribution in anaesthesia-related deaths, 2016 (n=43)



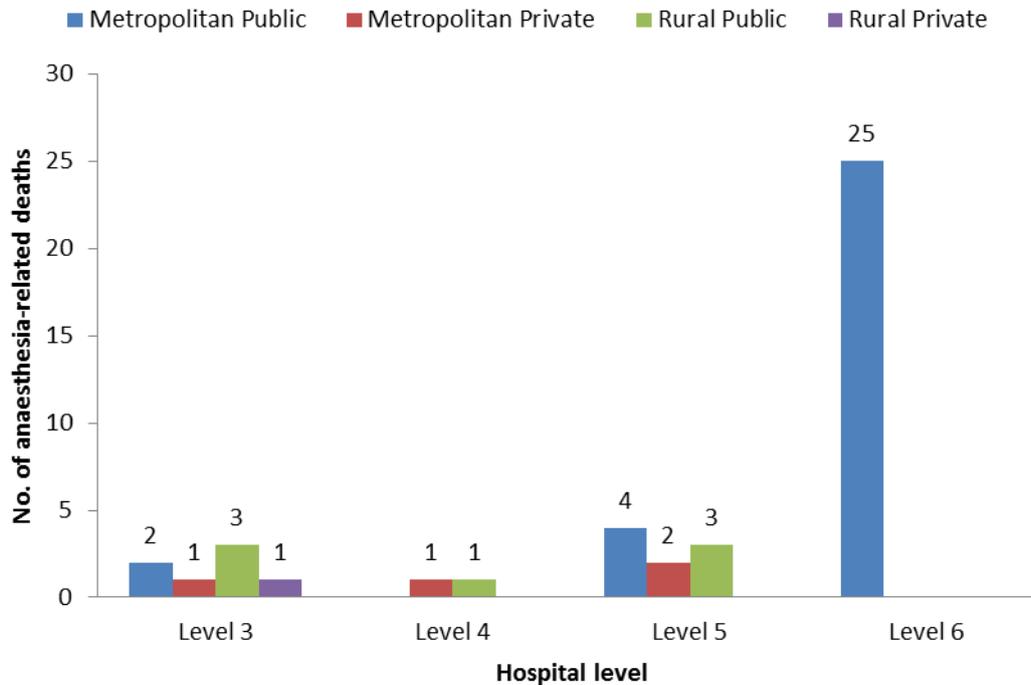
- Most anaesthesia-related deaths (95%, n=41) were ASA grade 3 or 4 and occurred in patients aged 65 and over. Twenty-four patients were aged over 81 years, and 23 of these patients were ASA grade 3 or 4. Anaesthetists are frequently giving anaesthetics to very old and sick patients and anaesthesia poses a significant risk to this group
- The elderly ASA 2 patient had a post mortem that showed pathology that, if known, might have changed the classification to ASA 3

<sup>6</sup>The American Society of Anesthesiologists (ASA) Physical Status rating grades patients according to their health (see Appendix C).

### 8.4.3 Hospitals

SCIDUA classifies hospitals into six levels, using a numerical system (Appendix D) based on, but not identical to, the NSW Guide to Role Delineation of Health Services<sup>7</sup>. Figure 3 shows the distribution of anaesthesia-related deaths in NSW hospitals.

Figure 3: Distribution of anaesthesia-related deaths by hospital type, 2016 (n=43)

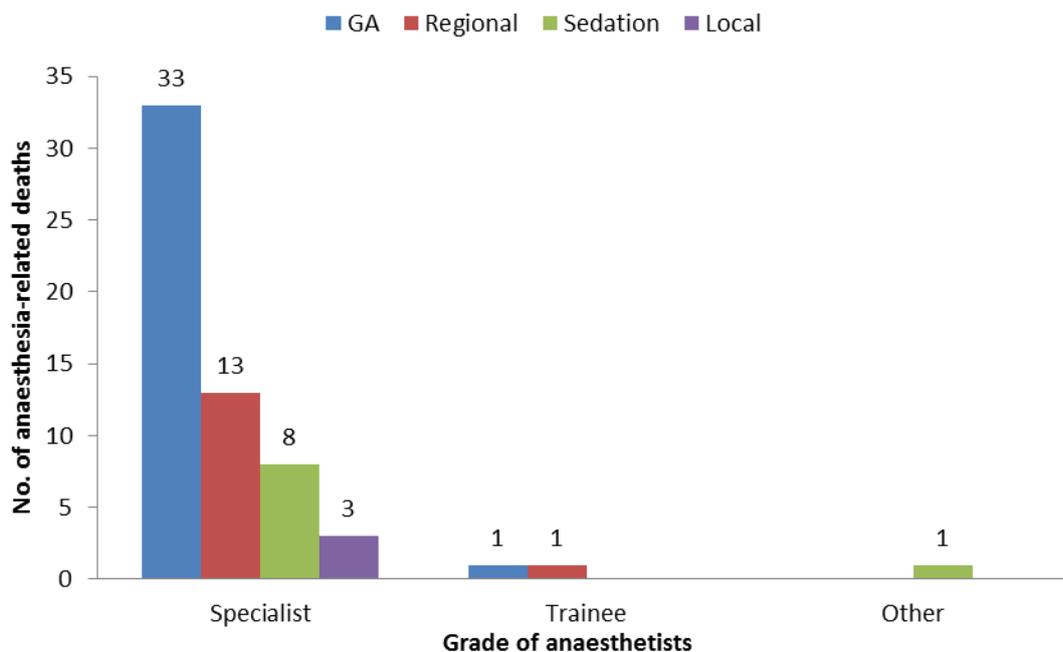


- The majority of anaesthesia-related deaths (65%, n=28) occurred in Level 5 or 6 metropolitan public teaching hospitals where higher volumes of complicated surgery are performed
- Seven (16%) occurred in rural public hospitals
- Four (9%) occurred in metropolitan private hospitals
- Three (7%) occurred in metropolitan public non-teaching hospitals
- All deaths at level 3 hospitals occurred in ASA 3 or 4 patients, and in five patients (71%) the Committee was satisfied with the conduct of the anaesthesia

<sup>7</sup>NSW Health Department, 2002, *Guide to the Role Delineation of Health Services*, viewed 22 September 2009  
<http://www.health.nsw.gov.au/services/Publications/guide-role-delineation-health-services.pdf>

#### 8.4.4 Anaesthetists and anaesthesia

Figure 4: Distribution of anaesthesia-related deaths by grade of anaesthetists and type of anaesthetics administered, 2016 (n=43)



- Most anaesthesia-related deaths (77%, n=33) had a general anaesthetic administered either by a specialist anaesthetist or with the close supervision of a specialist anaesthetist
- Thirteen (30%) had a regional type of anaesthesia administered by a specialist anaesthetist
- Sedation was reported in nine (21%) deaths. Nearly all (89%, n=8) were administered by specialist anaesthetists
- Trainee anaesthetists administered the anaesthesia/sedation in only one (2%) of the anaesthesia-related deaths

#### 8.4.5 Surgery and urgency

SCIDUA classifies the timing of surgery as emergency, urgent, urgent non-emergency, and scheduled (refer to Appendix E for definitions). The Australian and New Zealand College of Anaesthetists (ANZCA) Mortality Sub-committee report into the "Safety of Anaesthesia in Australia" will now report urgency based on whether the patient was admitted for scheduled (elective) surgery or as an emergency admission.

The Committee found that, by far, the largest type represented was urgent non-emergency surgery. It accounted for most of the surgery performed in anaesthesia-related deaths (56%, n=24). Most of these cases were orthopaedic (79%, n=19).

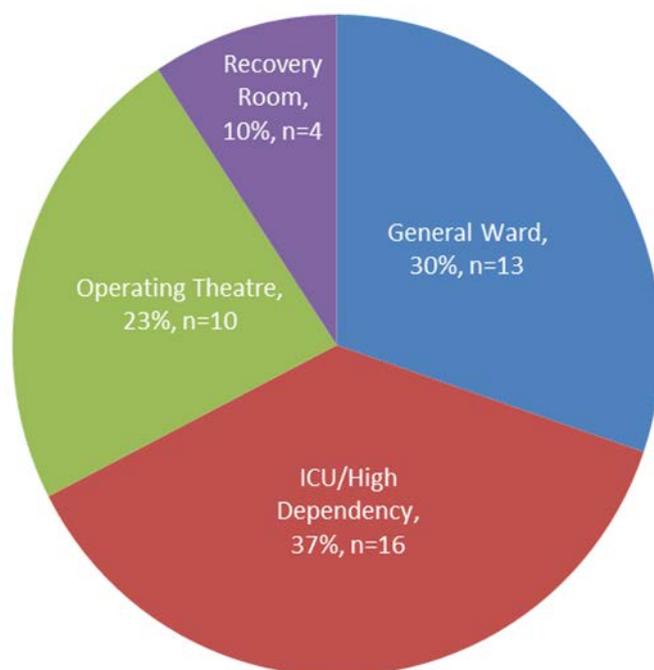
Scheduled surgery accounted for twelve (28%) of the cases performed in anaesthesia-related deaths. Some of these scheduled cases could have been emergency admissions to hospital, but the Committee was led to believe that the procedure was not critically time dependent and so there was time for appropriate assessment and management before surgery.

Five (12%) of the operations classified as anaesthesia-related deaths were performed as an emergency.

Orthopaedic surgery was performed in more than half of all anaesthesia-related deaths (53%, n=23). Other types of surgery performed had small numbers and included abdominal, cardiothoracic, non-invasive procedural investigations, urological and vascular operations.

### 8.4.6 Location of death

Figure 5: Distribution of anaesthesia-related deaths by location within the hospital, 2016 (n=43)



- Most anaesthesia-related deaths (37%, n=16) occurred in intensive care units (ICU) or high dependency units (HDU)
- There were thirteen (30%) anaesthesia-related deaths in the general ward, followed by deaths in the operating theatre (23%, n=10) and the recovery room (10%, n=4)

### 8.5 Deaths in the operating theatre

Deaths that happen directly under the anaesthetist's care – on the operating table, or shortly after in the recovery room, can be particularly confronting.

In 2016, the Committee reviewed sixty-one deaths that occurred in the operating theatre or procedural room. Of these, ten (16%) were classified as being anaesthesia-related (Table 6).

The Committee also considered that death was inevitable and outside the control of the surgeon and anaesthetist in forty-nine (80%) deaths in the operating theatre or procedural room.

Table 6: Classification of deaths in the operating theatre or procedural room by SCIDUA, 2016

Death Type	Category	No. of cases
Deaths attributable to anaesthesia	1, 2 & 3	10
Deaths in which anaesthesia played no part	4, 5 & 6	49
Un-assessable deaths	7 & 8	2
	<b>Total</b>	<b>61</b>

### 8.5.1 Anaesthesia-related deaths in the operating theatre

- The median age of “on table” anaesthesia-related deaths was 77 years (range: 50-96 years)
- Seventy per cent (n=7) were ASA 4, i.e., critically unwell. The rest were ASA 2 or 3, i.e., with mild or moderate systemic disease
- Cardiothoracic surgery was performed in more than 40% of these cases (n=4). The remainder underwent orthopaedic, vascular and non-invasive procedures
- Half the cases were scheduled (50%, n=5), the remainder were urgent non-emergency (40%, n=4), or emergency (10%, n=1) operations
- There were two cases (20%) of adverse drug event/anaphylaxis, and two cases (20%) in which bone cement implantation syndrome was implicated

### 8.6 Deaths associated with cemented hip arthroplasty

There were ten cases where the Committee considered the cause of death was related to bone cement. There were other cases where bone cement might have been used, but the Committee agreed that those deaths were not related to the typical bone cement implantation syndrome.

### 8.7 Deaths associated with haemorrhage

There were seventeen cases where death was thought to be due to uncontrolled haemorrhage as a complication of the patient’s disease process and the surgery. The Committee was satisfied with the anaesthetist’s management in every case.

### 8.8 Inevitable deaths

The majority of cases reported to the Committee in 2016 were classified as having no anaesthetic or surgical factors involved and are considered inevitable deaths (Category 5) (72%, n=202). These were cases where the patient’s disease or injury made recovery impossible, despite competent anaesthesia and surgery. The age and ASA grade<sup>8</sup> distribution among these inevitable deaths are presented in Figure 6.

Trauma was reported in thirty (15%) of these cases. Most inevitable deaths occurred after an operation or medical procedure listed as follows:

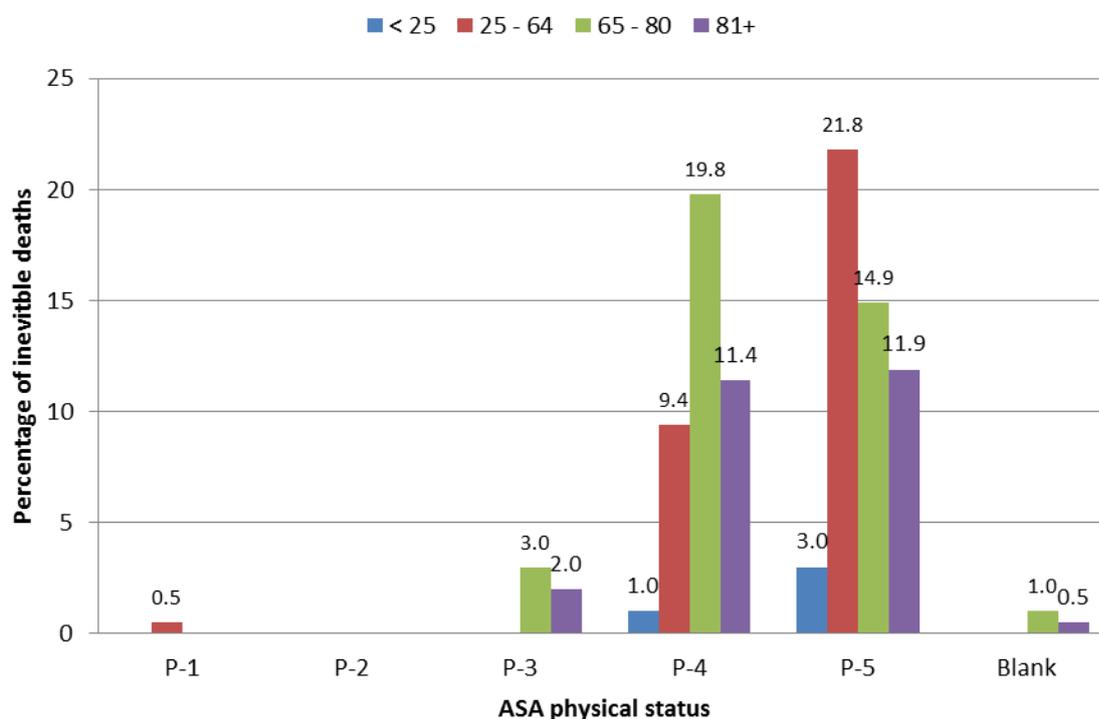
- Abdominal (34%, n=69)
- Endoscopic procedures (15%, n=30)
- Vascular (10%, n=20)
- Cardiothoracic (9%, n=18)
- Neurosurgery (7%, n=15)
- Multi-trauma (5%, n=11)
- General (non-abdominal) (5%, n=10)
- Other<sup>9</sup> (14%, n=29).

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<sup>8</sup> The American Society of Anesthesiologists (ASA) Physical Status rating grades patients according to their health (see Appendix C).

<sup>9</sup> Includes cardiac procedures, orthopaedic surgery, radiological procedures, resuscitation and urological surgery.

Figure 6: Distribution of age and ASA physical status in inevitable deaths, 2016 (n=202)



- Nearly all inevitable deaths (93%, n=188) were ASA grade 4 or 5, i.e., critically unwell, or not expected to survive for 24 hours
- Most were patients aged 65 or over (58%, n=117)
- All deaths under 25 years (4%, n=8) were ASA grade 4 or 5

### 8.9 Futile cases

These are cases where surgery is performed, when it is clear before starting, that no favourable outcome could be expected from the surgical intervention. The Committee classified five such cases in 2016.

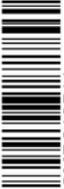
While it is understandably difficult to be put in a situation where medical practitioners are seen to be withholding treatment, the concepts of what is of benefit to the patient and what is and is not a medically appropriate procedure should be considered in cases where time allows.

### 8.10 Deaths not able to be assessed

There were five cases classified Categories 7 and 8. It is important to note that both these categories could have anaesthetic factors involved in the patient's death, but the Committee has been unable to assess them, usually due to a lack of information.

# Appendix A

## SCIDUA Notification Form

 SMR010511			FAMILY NAME		MRN	
	Facility:		GIVEN NAME		<input type="checkbox"/> MALE <input type="checkbox"/> FEMALE	
	<b>REPORT OF DEATH ASSOCIATED WITH ANAESTHESIA/SEDATION (PREVIOUSLY FORM B)</b>		D.O.B. ____/____/____		M.O.	
			ADDRESS			
			LOCATION			
			COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE			
	LOCATION OF DEATH (eg, OR, ICU, HDU etc)		DATE OF DEATH	TIME OF DEATH	WEIGHT	
	Pre-operative diagnosis / condition					
	ASA classification (please tick) <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> E					
	Operation(s) / procedure(s)					
Findings at operation/procedure						
Induction		DATE OF INDUCTION	TIME OF INDUCTION	TIME ANAESTHETIC CEASED		
Anaesthetic / Sedation (tick all relevant boxes) <input type="checkbox"/> GA <input type="checkbox"/> Regional <input type="checkbox"/> Local <input type="checkbox"/> Sedation						
List of all drugs given & doses (including premedication if any)						
Brief description of events						
Likely cause(s) of death						
Anaesthetist / Sedationist (Please print name, title and qualifications)		1. _____				
		2. _____				
Contact details of Medical Officer completing this report (for feedback)		PRIVATE MAILING ADDRESS		HOSPITAL ADDRESS		
Name of Medical Officer completing this report:		SIGNATURE		DATE		
Please send completed form to: Secretary NSW Health, c/o Special Committee Investigating Deaths Under Anaesthesia Clinical Excellence Commission, Locked Bag 8 HAYMARKET NSW 1240						

Holes Punched as per AS2828.11: 2012  
 BINDING MARGIN - NO WRITING

NH601685 301014

REPORT OF DEATH ASSOCIATED WITH ANAESTHESIA/SEDATION (PREVIOUSLY FORM B)

SMR010.511

SPECIAL COMMITTEE INVESTIGATING DEATHS UNDER ANAESTHESIA

## Appendix B

### Anaesthesia Mortality

#### GLOSSARY OF TERMS – CASE CLASSIFICATION

##### A Deaths attributable to anaesthesia

<b>Category 1</b>	Where it is reasonably certain that death was caused by the anaesthesia or other factors under the control of the anaesthetist.
<b>Category 2</b>	Where there is some doubt whether death was entirely attributable to the anaesthesia, or other factors under the control of the anaesthetist.
<b>Category 3</b>	Where death was caused by both surgical and anaesthesia factors.
<b>Explanatory notes:</b>	
<ul style="list-style-type: none"><li>• <i>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.</i></li><li>• <i>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, <u>sub-category H</u> should also be applied.</i></li><li>• <i>If no factor under the control of the anaesthetist is identified which could or should have been done better, <u>sub-category G</u> should also be applied.</i></li></ul>	

##### B Deaths in which anaesthesia played no part

<b>Category 4</b>	Surgical death where the administration of the anaesthesia is not contributory and surgical or other factors are implicated.
<b>Category 5</b>	Inevitable death, which would have occurred irrespective of anaesthesia or surgical procedure.
<b>Category 6</b>	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 Un-assessable deaths

<b>Category 7</b>	Those that cannot be assessed, despite considerable data, but where the information is conflicting or key data is missing.
<b>Category 8</b>	Cases which cannot be assessed because of inadequate data.

#### CAUSAL OR CONTRIBUTORY FACTORS IN CATEGORY A DEATHS

*Note that it is common for more than one factor to be identified in the case of anaesthesia- attributable death.*

##### SUB-CATEGORIES

##### A Pre-operative

<b>(i)</b> 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.
<b>(ii)</b> 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 contra-indicated, 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 re-institute 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 contra-indicated 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 tranquilising agents where reversal is indicated.
(v) Incomplete Recovery	For example, 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 Post-operative

(i) Management	Death as a result of inappropriate intervention or omission of active intervention by the anaesthetist or a person under direction (e.g., 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.

<b>(iii)</b> Inadequate Resuscitation	Death due to inadequate management of hypovolaemia or hypoxaemia, or where there has been a failure to perform proper cardiopulmonary resuscitation.
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#### **F Organisational**

<b>(i)</b> 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 inadequacy of supervision of a trainee is based on the ANZCA professional document on supervision of trainees.
<b>(ii)</b> Poor Organisation of the Service	Inappropriate delegation, poor rostering and fatigue contributing to a fatality.
<b>(iii)</b> 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 death was due to anaesthesia factors, but no better technique could be suggested.
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#### **H Medical condition of the patient**

Where it is considered that the medical condition was a significant factor in the anaesthesia-related death.
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## **Appendix C**

# **American Society of Anesthesiologists 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

### **E**

Patient requires emergency procedure

## Appendix D

### Hospital Level

The nomenclature is a numerical system based on, but not identical with, the NSW Guide to Role Delineation of Hospitals. It classifies hospitals as follows:

- Level 6:** A multi-disciplinary hospital, which provides facilities for most or all surgical sub-specialties and the intensive care environment to support them. Specialist and sub-specialist anaesthetic staff are on site during the day and anaesthetic registrar cover is on site 24 hours a day. This classification also applies to where a hospital is designated as a trauma centre.
- Level 5:** A hospital which is multi-disciplinary, but only provides some sub-specialty surgery and anaesthesia, with an appropriate post-operative environment. Specialist and sub-specialist anaesthetic staff are on site during the day and anaesthetic registrar cover is on site 24 hours a day, or available within 10 minutes.
- Level 4:** A multi-disciplinary hospital, which does not cater for all surgical specialities, but accepts some trauma and provides a lower level of intensive care, referring any patients in need of specialised life support to a higher-level facility. Specialist anaesthetic staff are on site during the day and provide an on-call service after hours.
- Level 3:** A hospital or day centre which undertakes a limited range of procedures, but does not have the capability to care for high-risk patients or surgery which necessitates high-level post-operative care. Specialist anaesthetic staff are on site during the day.
- Level 2:** A facility at which anaesthesia or sedation is provided to enable a single procedure to be undertaken on good-risk patients (such as stand-alone ECT or dentistry).
- Level 1:** Any other location at which anaesthesia or sedation is administered, such as a dental office.

If an institution or facility is in regional NSW, the suffix **R** is added and for private hospitals, the suffix **P**.

## Appendix E

### Urgency of cases

#### **Emergency**

Immediate surgery for a life-threatening condition (less than 30 minutes), e.g., ruptured abdominal aortic aneurysm, intracranial extra-dural haematoma, prolapsed umbilical cord.

#### **Urgent**

At the earliest available time to prevent physiological deterioration (30 minutes-4 hours), e.g., ruptured viscus, appendicitis, open wound, blocked ventriculo-peritoneal shunt.

#### **Urgent non-emergency**

The patient has a condition that requires emergency surgery, but there is time to allow medical optimisation and appropriate organisation of operating time and surgeons or surgical teams (4 hours to days), e.g., fractured neck of femur, pacemaker insertion, laparotomy for bowel obstruction.

#### **Scheduled**

Where the patient presents for elective surgery.

## Acknowledgement

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