Activities of the Special Committee Investigating Deaths Under Anaesthesia – 2010

Special Report

July 2012
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Foreword

Anaesthesia safety is a global public health issue. The advancement of safe practices in anaesthesia has made much of today’s surgery possible and has brought great benefits to patient safety. In NSW, more than one million individual episodes of anaesthesia care are recorded annually in all public and private hospitals.

Anaesthesia is very safe in Australia. The reporting of anaesthesia-related deaths has helped ensure the high quality and safety. In NSW, the requirement to notify anaesthesia-related deaths was included in the coronial legislation until January 2010 and has since been placed in the public health legislation. Further amendments to the public health legislation took effect on 1 September 2012, with the introduction of section 84 of the Public Health Act 2010, on notification of deaths arising after anaesthesia or sedation for operations or procedures.

The Special Committee Investigating Deaths Under Anaesthesia (SCIDUA) is the expert group appointed by the government. This report presents the committee’s findings on anaesthesia-related deaths that occurred in NSW between 2006 and 2010. It provides the evidence for demonstrating the safety and risk of anaesthesia. I thank the committee for their good work. I also acknowledge the commitment and support of the anaesthetic community to improving safety. This report would not be possible without their involvement.

I commend it to you.

Clifford F Hughes, AO
Clinical Professor
Chief Executive
Current SCIDUA membership

- Dr David Pickford, chair
- Dr Michele O’Brien, deputy chair & medical secretary
- A/Prof John Hilton
- Dr Elizabeth O’Hare
- Dr Frances Smith
- Dr Matthew Crawford
- Prof Arthur (Barry) Baker
- Prof Ross Holland
Executive Summary

The NSW Special Committee Investigating Deaths Under Anaesthesia (the committee) has been reviewing anaesthesia-related deaths since 1960 and is the longest-serving committee of its type in the world. It was the forerunner of the other State anaesthetic mortality committees in Australia. The committee has been contributing data for the triennial reviews of anaesthesia-related mortality in Australia, published by the Australian and New Zealand College of Anaesthetists (ANZCA), since the mid-1980s. NSW contributed more than half of the data published in the last ANZCA report for the 2006 to 2008 period.

In 2010, the legal requirement to report to the committee was removed from the Coroners Act 1980 and placed in the Public Health Act 1991. It is not yet possible to ascertain whether all anaesthesia-related deaths are reported under that provision. Our data, however, indicates that over 97 per cent of anaesthetists responded to requests for further information after they submitted a notification to the committee. This figure represents a very high rate of voluntary reporting of anaesthesia-related mortality.

Due to the small number of anaesthesia-related deaths reported in 2010, an analysis was made of all the data reported in the five years, 2006-2010. For this period, the committee reviewed 939 cases where death had occurred during, due to, or within 24 hours of an anaesthetic. It classified 167 cases to be wholly or partly related to anaesthetic factors. A summary follows.

- The majority of the patients were elderly, with 77 per cent (n=129) older than 65 and 43 per cent (n=72) older than 81.
- More than half (54%, n=90) were ASA grade 4 or 5, i.e., critically unwell or not expected to survive for 24 hours. Eighty-four per cent (n=141) were ASA grade 3, 4 or 5, i.e., had significant or life-threatening inter-current illness.
- In 59 per cent (n=99) of cases, no correctable anaesthetic factor could be identified. Modern anaesthesia still poses a risk to patients undergoing surgery, despite advances in drugs, monitoring and techniques.
- Correctable anaesthetic factors were seen in 41 per cent (n=68) of cases. The most common were inadequate pre-operative assessment and inappropriate drug dosage.

These findings should be viewed in light of the retrospective nature of the committee’s deliberations.

Between 2006 and 2010, the average estimated resident population in NSW reported by the Australian Bureau of Statistics, was about 7.02 million. Using this figure, the anaesthesia-related mortality rate for NSW was about 4.76 deaths per million per annum. There were approximately 5.45 million individual episodes of anaesthesia care.

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1 The American Society of Anesthesiologists (ASA) physical status rating grades patients according to their health (see Appendix B).
2 Intercurrent disease occurs at same time and may impact on other disease processes.
recorded at all public and private hospitals in NSW during the five-year period\(^4\). Using this figure, the anaesthesia-related mortality rate was 1:32,634. This is similar to the NSW figure of 33,000 anaesthetics per death, reported in the ANZCA triennial report on safety of anaesthesia for 2006 to 2008\(^5\). The mortality rate of anaesthetic deaths with correctable factors is 1:80,147.

While striving to improve the safety of anaesthesia in NSW, it is important to consider the increasing age and frailty of patients now undergoing surgery. Orthopaedic and cardiothoracic surgery carried out on elderly patients still contribute the majority of cases reviewed by the committee. There is ongoing concern and review of the relatively high contribution of deaths during and after hip fracture surgery.

\(^4\) This figure was obtained from the Australian Institute of Health and Welfare (AIHW) at www.aihw.gov.au. 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.

\(^5\) Australian and New Zealand College of Anaesthetists: Safety of anaesthesia in Australia 2006-2008. Editor: Dr Neville Gibbs.
1. The SCIDUA Committee

The Special Committee Investigating Deaths under Anaesthesia (SCIDUA) is an expert committee appointed by the Minister for Health. Its terms of reference are:

‘to subject all deaths occurring while under, as a result of, or within 24 hours after the administration of anaesthesia, to peer review so as to identify any areas of clinical management where alternative methods could have led to a more favourable result’.

The Minister appoints members for a fixed term of five years, at the end of which time, 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 Ministry of Health or Clinical Excellence Commission (CEC) representative. The committee elects its own chairperson, who must be a currently practising anaesthetist.

The committee tries to ensure that anaesthetists from a broad range of clinical specialties and professional organisations are represented. Nominations for membership come from the Australian and New Zealand College of Anaesthetists (ANZCA), the Australian Society of Anaesthetists and academic departments of anaesthetics. There is also a consultant forensic pathologist on the committee to help review autopsy findings.

2. Reporting deaths to SCIDUA

The death of a patient should be reported to SCIDUA when it occurs while under, as a result of, or within 24 hours after the administration of an anaesthetic, for a medical, surgical, dental, or like procedure. This reporting requirement was stipulated in the Coroners Act 1980 and deaths were reported to SCIDUA via the coronial system. A copy of the Form B “Report of Death Associated with Anaesthesia/Sedation” required by the Coroner would be sent to the committee by the hospital.

Since 1 January 2010, reporting of deaths associated with anaesthetic administration is no longer included in the Coroners Act 2009, unless the “death was not a reasonably expected outcome of a health-related procedure...”. To ensure that reporting to SCIDUA continued, the Public Health Act 1991 and Public Health (General) Regulation 2002 were amended to make a death occurring “while under, or as a result of, or within 24 hours after the administration of, an anaesthetic administered in the course of a medical, surgical or dental operation or procedure, or an operation or procedure of a like nature (other than a local anaesthetic administered solely for the purpose of facilitating a procedure for resuscitation from apparent or impending death)” a Category 1 Scheduled Medical Condition.

Category 1 Scheduled Medical Conditions must be reported to the Director-General. In relation to anaesthesia-related deaths, anaesthetists are required to notify by completing the State form (SMR010.511): Report of death associated with anaesthesia/sedation (SCIDUA notification form – Appendix A).
On 1 September 2012, the Public Health Act 2012 came into effect and introduced the requirement to report deaths arising after sedation. Section 84 of the Act requires the notification of deaths arising after anaesthesia or sedation:

‘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. This can be ordered from Salmat (Ph: 02 9311 9999 or www.salmat.com.au). It can also be downloaded at:

3. Confidentiality

The committee’s documents are legally protected from disclosure under s 23 of the NSW Health Administration Act 1982. Confidentiality of all communications between the reporting anaesthetist and the committee is paramount.

4. Reporting back

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 Working Group, 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 is this 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 agents are either cardiovascular and/or respiratory depressants and their administration is subject to human error.

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

After notification via either the Coroner's office, the new form of notification, other committees, or self-referral by an anaesthetist, the cases are collected and initially reviewed by SCIDUA's triage sub-committee.

The triage process determines whether a more detailed questionnaire needs to be sent to the anaesthetist, or whether the case can be classified based on the available information. A questionnaire is always sent if there is any suspicion that the anaesthetic was involved, or that the patient died during the procedure.

Meetings are normally held once a month, depending on the number of cases prepared. The classification system was developed by the Australian National Anaesthetic Mortality Committee. It relies on expert opinion and consensus. While it is therefore subjective to some extent, the committee has several members who have served for 10-20 years or more. It is important to note that the process is a retrospective review of cases where there has been a known outcome of death. The committee is reviewing whether alternative management may have altered the outcome.

The committee manages its data in a secure Microsoft Access 2003/SQL server relational database. It stores data on patients and anaesthetists, as well as that collected from the Form B/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

The full system of classification may be seen in Appendix A at the end of this report.

Group A contains deaths where anaesthetic factors are thought to have played a role. There are three categories:

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

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

- Category 4 for surgical deaths
- Category 5 for inevitable deaths (with or without surgery)
- Category 6 for 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 are inadequate.
8. Results – Part 1

8.1 Presentation of Committee Activities 2010

Table 1: Cases reviewed and classified/finalised by SCIDUA 2010

<table>
<thead>
<tr>
<th>Meeting no.</th>
<th>Reviewed</th>
<th>Classified</th>
<th>More information</th>
</tr>
</thead>
<tbody>
<tr>
<td>468</td>
<td>8</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>469</td>
<td>9</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>470</td>
<td>10</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>471</td>
<td>12</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>472</td>
<td>10</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>473</td>
<td>13</td>
<td>13</td>
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</tr>
<tr>
<td>474</td>
<td>13</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>475</td>
<td>15</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>90</strong></td>
<td><strong>88</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>

Table 2: Cases reviewed and classified/finalised by triage sub-committee 2010

<table>
<thead>
<tr>
<th>Triage no.</th>
<th>Reviewed</th>
<th>Classified</th>
<th>More information</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>24</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>72</td>
<td>42</td>
<td>26</td>
<td>16</td>
</tr>
<tr>
<td>73</td>
<td>32</td>
<td>23</td>
<td>9</td>
</tr>
<tr>
<td>74</td>
<td>28</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>75</td>
<td>19</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>76</td>
<td>41</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>77</td>
<td>34</td>
<td>26</td>
<td>8</td>
</tr>
<tr>
<td>78</td>
<td>25</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>245</strong></td>
<td><strong>155</strong></td>
<td><strong>90</strong></td>
</tr>
</tbody>
</table>

Table 3: Summary of activity 2010

| Reviewed by triage | 245 |
| Reviewed by the committee | 90 |
| **Total cases reviewed** | **335** |
| Finalised cases by triage | 155 |
| Finalised cases by the committee | 88 |
| **Total cases finalised** | **243** |
The committee met eight times during 2010 and, together with the triage sub-committee finalised 243 cases. Some cases do not fall within the terms of reference of the committee – usually because the patient died more than 24 hours after the operation and anaesthetic. These are called inappropriate referral and are excluded from further study. In total, 221 cases were classified using the system described above.

8.1.1 Review of the findings of the NSW Special Committee Investigating Deaths Under Anaesthesia 2010

Table 4: Classification of cases reviewed in 2010

<table>
<thead>
<tr>
<th>Death Type</th>
<th>Category</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths attributable to anaesthesia</td>
<td>1 &amp; 2*</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>38</td>
</tr>
<tr>
<td>Deaths in which anaesthesia played no part</td>
<td>4, 5 &amp; 6*</td>
<td>158</td>
</tr>
<tr>
<td>Un-assessable deaths</td>
<td>7 &amp; 8*</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>221</strong></td>
</tr>
</tbody>
</table>

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

8.2 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) and those where both anaesthetic and surgical factors are involved (Category 3). There were 47 anaesthesia-related deaths classified in 2010. It is important to realise that there are two subsets of anaesthesia-related death - those in which the anaesthetic management could have been improved and those in which the committee could not suggest any way in which alternative management could have averted the fatal outcome.

8.2.1 Anaesthesia-related but no correctable factors identified

Thirty of the deaths attributable to anaesthesia were classified with a suffix GH (Appendix 1), indicating that, although the committee felt that anaesthetic and surgical factors contributed to the patient’s death, no fault could be found with management by the anaesthetist. In these patients, the inter-current medical condition was contributory to the death. The majority of these cases were undergoing orthopaedic (43%) or cardiothoracic surgery (30%).

8.2.2 Anaesthesia-related with correctable factors

The committee classified 17 cases in 2010 as having correctable factors in the anaesthetic management. The five most frequent correctable factors identified were:

- inadequate pre-operative assessment
• inadequate intra-operative crisis management
• inadequate resuscitation
• inappropriate drug dosage
• inadequate intra-operative monitoring.

8.3 Inevitable deaths

The vast majority of cases reported to the committee are classified as having no anaesthetic or surgical factors involved and are considered inevitable deaths (Category 5). These were cases where the patient’s disease or injury made recovery impossible despite competent anaesthesia and surgery. Patients who died because of significant multi-trauma are not separately grouped, but would appear among the abdominal, cardiothoracic, neurosurgical and orthopaedic group, according to their primary operation. A change to data entry in the future will allow multi-trauma to be separately grouped. Most inevitable deaths followed abdominal operations, vascular surgery and cardiothoracic surgery (Figure 1). Figure 2 presents the frequency and distribution of inevitable deaths by age grouping. The majority of patients (63%, 92/147) were aged 65 or older, with one-fifth aged 81 or older (20%, 29/147)

Figure 1: Category 5 inevitable deaths 2010 by surgery type (n=147)

* Aggregated data are reported, due to small numbers in these surgery types (n≤5).
8.4 Deaths not able to be assessed

There were 16 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, or in one case, despite considerable details being available.

8.5 Futile cases

These are cases where surgery is performed in circumstances in which it is clear before commencement of surgery that no favourable outcome could be expected from surgical intervention. The committee classified 9 such cases in 2010.

8.6 Deaths in the operating theatre

The most confronting anaesthetic death is the one that happens “on the operating table” directly under the anaesthetist’s care.

In 2010, the committee was notified of 67 deaths that occurred in the operating theatre or procedure room. Of these, 19 (28.3%) were classified as being anaesthesia-related.
### Table 5: Classification of deaths in the operating theatre reviewed

<table>
<thead>
<tr>
<th>Death Type</th>
<th>Category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths attributable to anaesthesia</td>
<td>1, 2 &amp; 3*</td>
<td>19</td>
</tr>
<tr>
<td>Deaths in which anaesthesia played no part</td>
<td>4, 5 &amp; 6*</td>
<td>43</td>
</tr>
<tr>
<td>Un-assessable deaths</td>
<td>7 &amp; 8*</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>67</strong></td>
</tr>
</tbody>
</table>

The median age of “on table” anaesthesia-related deaths was 80.1 years, with 42 per cent (8/19) being aged 81 or older, 32 per cent (6/19) between 65 and 80 and 26 per cent (5/19) aged younger than 65.

Most patients (68%, 13/19) presented with mild to severe systemic disease (ASA 2 or 3) and 32 per cent (6/19) presented with an ASA physical status of 4 or 5.

Orthopaedic surgery was performed in 42 per cent (8/19) of these cases. The remaining 58 per cent underwent abdominal surgery, cardiothoracic surgery, urological, vascular surgery, or an endoscopic procedure.

Most cases were urgent/emergency (11/19, 58%) followed by scheduled (8/19, 42%).

The typical anaesthetic-related “on the operating table” death:

- was about 80 years of age
- presented with mild to severe systemic disease
- underwent an orthopaedic procedure
- underwent emergency or urgent surgery
- had a poor medical condition which contributed to the outcome
- had no correctable factors.
9. Results – Part 2

9.1 Presentation of cases reviewed 2006 - 2010

Table 6: Classification of cases reviewed 2006 - 2010

<table>
<thead>
<tr>
<th>Death Type</th>
<th>Category</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths attributable to anaesthesia</td>
<td>1 &amp; 2 *</td>
<td>9</td>
<td>11</td>
<td>7</td>
<td>7</td>
<td>9</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>11</td>
<td>36</td>
<td>24</td>
<td>15</td>
<td>38</td>
<td>124</td>
</tr>
<tr>
<td>Deaths in which anaesthesia played no part</td>
<td>4, 5 &amp; 6 *</td>
<td>181</td>
<td>183</td>
<td>119</td>
<td>96</td>
<td>158</td>
<td>737</td>
</tr>
<tr>
<td>Un-assessable deaths</td>
<td>7 &amp; 8 *</td>
<td>1</td>
<td>8</td>
<td>3</td>
<td>7</td>
<td>16</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>202</td>
<td>238</td>
<td>153</td>
<td>125</td>
<td>221</td>
<td>939</td>
</tr>
</tbody>
</table>

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

- There were 167 anaesthesia-related deaths (Categories 1-3) for the period 2006-2010.
- The considerable reduction in the total numbers of classified cases in 2008 and 2009 coincided with the changes to the coronial legislation, suggesting that some anaesthetists might have thought that the requirement to notify anaesthesia-related deaths was no longer applicable.
9.2 Age and sex

The following figure shows the gender distribution and age groups of patients of anaesthesia-related deaths (Categories 1, 2 and 3).

Figure 3: Anaesthesia-related deaths by age and sex 2006-2010 (n=167)

*Total number is reported for this age group, due to small numbers in each gender (n≤5). Missing data = 1

- There were more males in each of the age groups up to 80 years, however, as to be expected, there were more females in the 80+ age group.
- More than three-quarters of the patients (77%, 129/167) were older than 65 and about 43 per cent (72/167) were older than 81.
9.3 ASA physical status

Figure 4: Anaesthesia-related deaths by ASA physical status 2006-2010 (n=167)

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

Figure 5: ASA physical status by age for anaesthesia-related deaths 2006-2010 (n=167)

Missing data = 1

6 The American Society of Anesthesiologists (ASA) Physical Status rating grades patients according to their health (see Appendix B).
As seen in Figures 3, 4 and 5, most patients were not only elderly, but many also had significant inter-current disease (diseases occurring at same time that may impact on each other). Fifty-four per cent (90/167) were ASA grade 4 or 5, i.e., critically unwell or not expected to survive and 84 per cent (141/167) were ASA grade 3, 4 or 5, i.e., had significant or life-threatening inter-current illness.

There were nine cases of anaesthesia-related deaths in patients assessed by the reporting anaesthetists as ASA 1 or 2. With the information available to the committee at the time of review, five of these cases should have been classified at least as ASA 3.

In three of the nine cases, the patient died from complications of a previously unrecognised cardiac condition. The committee agreed that there were no indications for a more thorough pre-operative work-up.

In one of the nine cases, the patient died as a direct complication of a drug intervention that the committee felt was not indicated.

There were no correctable anaesthetic factors involved in the deaths of ASA 1 patients.

9.4 Type of surgery

Table 7: Type of surgery by age for anaesthesia-related deaths 2006-2010 (n=167)

<table>
<thead>
<tr>
<th>Surgery Type</th>
<th>0 - 24</th>
<th>25 - 44</th>
<th>45 - 64</th>
<th>65 - 80</th>
<th>80+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthopaedic</td>
<td>1</td>
<td>8</td>
<td>14</td>
<td>42</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Cardiothoracic</td>
<td>2</td>
<td>1</td>
<td>9</td>
<td>13</td>
<td>7</td>
<td>32</td>
</tr>
<tr>
<td>Abdominal</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>9</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Non-invasive procedural</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Vascular</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>General (non-abdominal)</td>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Other - nil</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Urology</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENT/Head and Neck</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Dental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Missing data = 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Orthopaedic cases accounted for 39 per cent (65/167) and cardiothoracic a further 19 per cent (32/167) of anaesthesia-related deaths.

Sixty-five per cent (42/65) of orthopaedic cases were older than 81 and 86 per cent (56/65) older than 65. These accounted for 34 per cent (56/167) of all anaesthesia-related deaths.
Sixty-three per cent (20/32) of cardiothoracic cases were older than 65 and accounted for a further 12 per cent (20/167) of anaesthesia-related deaths.

9.5 Hospital level

Figure 6: Hospital level of anaesthesia-related deaths 2006-2010 (n=167)

The committee classifies hospitals/facilities according to a nomenclature based on the NSW Guide to Role Delineation of Hospitals (Appendix D).

Most of the cases reviewed came from level 6 metropolitan public hospitals. This is not unexpected, because they treat the majority of urgent, emergency and critically ill patients. When reviewing cases, the committee does not know the classification of the hospital. No conclusions can be drawn about the adequacy of care at each hospital type.

9.6 Anaesthetist grade

Table 8: Grade of anaesthetist for anaesthesia-related deaths 2006-2010 (n=167)

<table>
<thead>
<tr>
<th>Grade of anaesthetist</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialist</td>
<td>145</td>
</tr>
<tr>
<td>Trainee/Registrar</td>
<td>8</td>
</tr>
<tr>
<td>Non-specialist</td>
<td>6</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
</tr>
</tbody>
</table>

Eighty-seven per cent (145/167) of anaesthetists were specialist trained. The non-specialists did not have a Fellowship of the Australian and New Zealand College of Anaesthetists or an equivalent qualification and their exact level of experience was unknown. The category “other” was used to describe non-anaesthetic physicians administering sedation and/or anaesthesia to facilitate a medical procedure.
9.7 Urgency of surgery

Most urgent cases were orthopaedic (62%, 45/73), followed by cardiothoracic surgery (14%, 10/73) (see Figure 7).

Most scheduled cases were cardiothoracic (38%, 21/56), followed by orthopaedic surgery (21%, 12/56).

Most of the emergency cases (89%, 32/36) were non-invasive procedural-endoscopy (25%, 9/36), abdominal (25%, 9/36), vascular (19%, 7/36) and orthopaedic (19%, 7/36) procedures.

Figure 7: Urgency by surgery type for anaesthesia-related deaths 2006-2010 (n=167)
### 9.8 Causal or contributory factors

**Table 9: Causal or contributory factors in anaesthesia-related deaths 2006-2010 (n=167)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A Pre-operative</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ai</td>
<td>Assessment</td>
<td>28</td>
</tr>
<tr>
<td>Aii</td>
<td>Management</td>
<td>14</td>
</tr>
<tr>
<td><strong>B Anaesthetic technique</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bi</td>
<td>Choice or application</td>
<td>18</td>
</tr>
<tr>
<td>Bii</td>
<td>Airway maintenance</td>
<td>14</td>
</tr>
<tr>
<td>Biii</td>
<td>Ventilation</td>
<td>3</td>
</tr>
<tr>
<td>Biv</td>
<td>Circulatory support</td>
<td>9</td>
</tr>
<tr>
<td><strong>C Anaesthesia drugs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ci</td>
<td>Selection</td>
<td>8</td>
</tr>
<tr>
<td>Cii</td>
<td>Dosage</td>
<td>23</td>
</tr>
<tr>
<td>Ciii</td>
<td>Adverse event</td>
<td>2</td>
</tr>
<tr>
<td>Civ</td>
<td>Incomplete recovery</td>
<td>0</td>
</tr>
<tr>
<td>Cv</td>
<td>Inadequate recovery</td>
<td>0</td>
</tr>
<tr>
<td><strong>D Anaesthetic management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Di</td>
<td>Crisis management</td>
<td>11</td>
</tr>
<tr>
<td>Dii</td>
<td>Inadequate monitoring</td>
<td>15</td>
</tr>
<tr>
<td>Diii</td>
<td>Equipment failure</td>
<td>0</td>
</tr>
<tr>
<td>Div</td>
<td>Inadequate resuscitation</td>
<td>7</td>
</tr>
<tr>
<td>Dv</td>
<td>Hypothermia</td>
<td>0</td>
</tr>
<tr>
<td><strong>E Post-operative</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ei</td>
<td>Management</td>
<td>8</td>
</tr>
<tr>
<td>Eii</td>
<td>Supervision</td>
<td>4</td>
</tr>
<tr>
<td>Eiii</td>
<td>Inadequate resuscitation</td>
<td>3</td>
</tr>
<tr>
<td><strong>F Organisational</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fi</td>
<td>Inadequate supervision or assistance</td>
<td></td>
</tr>
<tr>
<td>Fii</td>
<td>Poor organisation</td>
<td>4</td>
</tr>
<tr>
<td>Fiii</td>
<td>Poor planning</td>
<td>13</td>
</tr>
<tr>
<td><strong>G No correctable factor</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>99</td>
</tr>
<tr>
<td><strong>H Medical condition of patient a significant factor</strong></td>
<td></td>
<td>122</td>
</tr>
</tbody>
</table>

*The figures add up to more than 167, because some patient deaths were identified to have more than one causal or contributory factor.*
9.8.1 Anaphylaxis as a cause of death

For this reporting period, there were two cases of presumed anaphylaxis with elevated mast cell tryptase level. The cause was not determined, but both patients had received antibiotics and non-depolarising muscle relaxants. The committee felt that the anaesthetist managed these events appropriately.

9.8.2 Airway difficulties as a cause of death

In 14 cases death was associated with airway difficulties.

- Eight cases were aspiration.
  - Four of unexpected aspiration.
  - Two the committee considered should have a formal rapid sequence induction.
  - Two had a rapid sequence induction and stomach contents were noted entering the airway.
- Three cases had loss of airway associated with sedation. It should be noted that no anaesthetist was present.
- Two cases of airway failure with a laryngeal mask airway (LMA), requiring intubation. One included the unexpected aspiration.
- One case where a surgical airway was required after the anaesthetist was unable to place an endotracheal tube.

9.9 No correctable factor identified

In 59 per cent (99/167) of cases, no correctable factor could be identified. This indicates that for some patients, anaesthetic factors contributed to the death, despite apparent optimal anaesthetic management. In other words, the committee considered that the patients might not have died at the time they did if they had not had surgery and anaesthesia. It was reasonable and expected, however, for the patient to have the operation. In 98 cases, it was considered that the patient's poor medical condition also contributed to the poor outcome. These results reflect the current willingness to operate on sicker patients.

9.10 Correctable factors

In 41 per cent (68/167) of anaesthesia-related deaths, the committee considered there were correctable factors. The most common was inadequate pre-operative assessment (41%, 28/68). This was followed by inappropriate drug dosage (34%, 23/68), inappropriate choice or application of anaesthetic technique (26%, 18/68), inadequate or inappropriate airway maintenance (22%, 15/68), inadequate intra-operative monitoring (22%, 15/68), inadequate pre-operative management (21%, 14/68) and organisational poor planning (19%, 13/68).
9.10.1 Inadequate pre-operative assessment

Inadequate assessment was a more prevalent finding in patients having diagnostic endoscopy and orthopaedic procedures (see Figure 8). It was not clear why this might be the case. Patients having diagnostic endoscopies may not have the usual pre-operative assessment given to those having more invasive procedures, due to the presumed low risk of the procedure and the rapid turnover of cases. Again, it is important to remember the retrospective analysis afforded by the committee’s process.

**Figure 8: Inadequate pre-operative assessment by surgery type 2006-2010 (n=28)**

*Other surgery types include vascular, abdominal, urology, cardiothoracic and dental. Aggregated data is reported, due to small numbers in each of these types (n≤5).

It might be expected that urgency of the case was a possible cause of inadequate assessment, but this was not shown to be consistent (see Figure 9).
9.10.2 Incorrect drug dosage

The committee assigns this factor when it was clear that there was a direct relationship with the drug administration and an adverse outcome. Drug dosages are dependent on many factors and there is a huge variability between patients, especially in the elderly and in those patients with significant inter-current illness.

The following characteristics were noted in 23 anaesthesia-related deaths, where incorrect drug dosage was identified as a correctable factor.

- The majority of patients were older than 65 (87%, 20/23), with over half being aged 81 or older (57%, 13/23).
- Forty-four per cent had an emergency procedure (10/23).
- Orthopaedic surgery was performed in 35 per cent (8/23), followed by abdominal surgery (22%, 5/23), non-invasive procedural-endoscopy (22%, 5/23) and vascular (13%, 3/23) operations.
**Appendix A - SCIDUA Notification Form**

```
<table>
<thead>
<tr>
<th>Facility:</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>LOCATION OF DEATH (eg. OR, ICU, HDU etc)</th>
<th>DATE OF DEATH</th>
<th>TIME OF DEATH</th>
<th>WEIGHT</th>
</tr>
</thead>
</table>

**Pre-operative diagnosis / condition**

**ASA classification (please tick)**

- [ ] 1
- [ ] 2
- [ ] 3
- [ ] 4
- [ ] 5
- [ ] E

**Operation(s) / procedure(s)**

**Findings at operation / procedure**

**Induction**

<table>
<thead>
<tr>
<th>DATE OF INDUCTION</th>
<th>TIME OF INDUCTION</th>
<th>TIME ANAESTHETIC CEASED</th>
</tr>
</thead>
</table>

**Anaesthetic / Sedation (tick all relevant boxes)**

- [ ] GA
- [ ] Regional
- [ ] Local
- [ ] Sedation

**List of all drugs given & doses (including premedication if any)**

**Brief description of events**

**Likely cause(s) of death**

1.

2.

**Anaesthetist / Sedationist**

(Please print name, title and qualifications)

1. ____________________________

2. ____________________________

**Contact details of Medical Officer completing this report**

<table>
<thead>
<tr>
<th>PRIVATE MAILING ADDRESS</th>
<th>HOSPITAL ADDRESS</th>
</tr>
</thead>
</table>

**Name of Medical Officer completing this report:**

<table>
<thead>
<tr>
<th>SIGNATURE</th>
<th>DATE</th>
</tr>
</thead>
</table>

Please send completed form to:

Director General, c/o Special Committee Investigating Deaths Under Anaesthesia

Clinical Excellence Commission, GPO Box 1614, SYDNEY NSW 2001

SPECIAL COMMITTEE INVESTIGATING DEATHS UNDER ANAESTHESIA
```
Appendix B - Anaesthesia Mortality

GLOSSARY OF TERMS – CASE CLASSIFICATION

A Deaths attributable to anaesthesia

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>Where it is reasonably certain that death was caused by the anaesthesia or other factors under the control of the anaesthetist.</td>
</tr>
<tr>
<td>Category 2</td>
<td>Where there is some doubt whether death was entirely attributable to the anaesthesia or other factors under the control of the anaesthetist.</td>
</tr>
<tr>
<td>Category 3</td>
<td>Where death was caused by both surgical and anaesthesia factors.</td>
</tr>
</tbody>
</table>

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, sub-category H should also be applied.
- If no factor under the control of the anaesthetist is identified which could or should have been done better, sub-category G should also be applied.

B Deaths in which anaesthesia played no part

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 4</td>
<td>Surgical death where the administration of the anaesthesia is not contributory and surgical or other factors are implicated.</td>
</tr>
<tr>
<td>Category 5</td>
<td>Inevitable death, which would have occurred irrespective of anaesthesia or surgical procedure.</td>
</tr>
<tr>
<td>Category 6</td>
<td>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.</td>
</tr>
</tbody>
</table>

C Un-assessable deaths

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 7</td>
<td>Those that cannot be assessed, despite considerable data, but where the information is conflicting or key data is missing.</td>
</tr>
<tr>
<td>Category 8</td>
<td>Cases which cannot be assessed because of inadequate data.</td>
</tr>
</tbody>
</table>

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

| (i) | 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. |
| (ii) | 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

<table>
<thead>
<tr>
<th>(i) Choice or Application</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ii) Airway Maintenance Including Pulmonary Aspiration</td>
<td>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.</td>
</tr>
<tr>
<td>(iii) Ventilation</td>
<td>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).</td>
</tr>
<tr>
<td>(iv) Circulatory Support</td>
<td>Failure to provide adequate support where there is haemodynamic instability, in particular in relation to techniques involving sympathetic blockade.</td>
</tr>
</tbody>
</table>

### 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 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

<table>
<thead>
<tr>
<th>(i) Management</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ii) Supervision</td>
<td>Death due to inadequate supervision or monitoring. The anaesthetist has ongoing responsibility, but the surgical role must also be assessed.</td>
</tr>
<tr>
<td>(iii) Inadequate Resuscitation</td>
<td>Death due to inadequate management of hypovolaemia or hypoxaemia, or where there has been a failure to perform proper cardiopulmonary resuscitation.</td>
</tr>
</tbody>
</table>

### F  Organisational

<table>
<thead>
<tr>
<th>(i) Inadequate Supervision, Inexperience or Assistance</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ii) Poor Organisation of the Service</td>
<td>Inappropriate delegation, poor rostering and fatigue contributing to a fatality.</td>
</tr>
<tr>
<td>(iii) Failure of interdisciplinary Planning</td>
<td>Poor communication in peri-operative management and failure to anticipate need for high-dependency care.</td>
</tr>
</tbody>
</table>

### G  No correctable factor identified

Where 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 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 is proposed that our new system will classify 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 (as stand-alone ECT or dentistry).

**Level 1:** Any other location at which anaesthesia or sedation is administered, such as a dental office.

If the above 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 life-threatening condition (less than 30 minutes), e.g., ruptured AAA, 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 VP 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.