Activities of the Special Committee Investigating Deaths under Anaesthesia

2018 Special Report

NSW GOVERNMENT

CLINICAL EXCELLENCE COMMISSION

DISCLAIMER

All identifying information has been omitted to preserve anonymity.

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NSW GOVERNMENT

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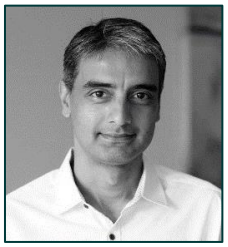

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Foreword

The Special Committee Investigating Deaths Under Anaesthesia (SCIDUA) has been reviewing deaths associated with anaesthesia and sedation since 1960.

The Terms of Reference of the Committee have always been to:

1. Review deaths which have occurred and ascertain factors which could have led to a different outcome and
2. Report back to medical practitioners matters where attention needs to be paid to ensure safety of anaesthesia

While the Committee has always been very good at collecting and analysing data, we have not been so good at reporting back to the medical community. I am hoping to change this.

We have, up till now, reported deaths in aggregate data with no clinical framework in order to preserve confidentiality of the information provided to SCIDUA by the reporting anaesthetist. The major drawback of using this method of reporting is that clinicians find it difficult to learn from this data and modify their own practice to ensure similar episodes are avoided.

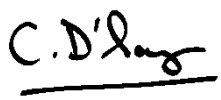
So, for the first time in the history of SCIDUA I am publishing real case examples in the hope that practitioners have a greater understanding of what the raw data actually means by adding a clinical reference point.

Reporters to SCIDUA should rest assured that all documents submitted to SCIDUA are deemed confidential under the *Health Administration Act 1982*, and that the only way that information can be released is with the consent of the reporting practitioner.

I would like to take this opportunity to thank all the Anaesthetists who have given their consent for these cases to be used in this report in order to better educate their colleagues and prevent future events from occurring. Your generosity is appreciated by all in the field.

I hope you find this report informative and, more importantly, educational.

Regards,



Dr Carl D'Souza
SCIDUA Chairman

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Executive Summary

The Special Committee Investigating Deaths Under Anaesthesia (SCIDUA) has been reviewing anaesthesia-related deaths since 1960. 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 encourage medical practitioners to report these deaths as soon as possible, and remind them that the law applies equally to both public and private facilities.

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 health practitioners in providing further details of their notified cases.

In 2018 the Committee reviewed 348 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, 290 fell within the terms of reference of the Committee and were then classified.

In 37 cases the death was wholly or partly related to anaesthetic factors, as follows:

- Anaesthesia either directly caused, or substantially contributed to, the patient's death in 9 cases (Category 1 and 2 [1])
- Anaesthesia and surgical factors contributed to the patient's death in the remaining 28 cases
- Most of the patients were elderly, with 81 per cent (n=30) older than 65 years, of which 51 per cent (n=19) older than 80 years
- More than half of the deaths (62% n=23) were ASA [2] grade 4 and 5, i.e., critically unwell. Nearly all cases (92%, n=34) were ASA grade 3, 4 and 5 i.e., had significant or life-threatening co-morbidities [3]
- Notably, in 65 per cent (n=24) 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

Of the 290 cases reviewed by SCIDUA, correctable anaesthetic factors were seen in 5 per cent (n=13) of cases. The most common factors were:

- Inadequate preoperative assessment
- Inadequate airway maintenance
- Inappropriate drug dosage
- Inadequate monitoring

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

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[1] SCIDUA Classifications of Anaesthetic Mortality (see Appendix C).

[2] The American Society of Anesthesiologists (ASA) physical status classification system. https://www.asahq.org/standards-and-guidelines/asa-physical-status-classification-system

[3] Co-morbidity is associated with worse health outcomes, more complex clinical management, and increased health care costs. It usually denotes the coexistence of two or more conditions or diseases in a patient.
Valderas, Jose M et al. "Defining comorbidity: implications for understanding health and health services." Annals of family medicine vol. 7,4 (2009): 357-63. doi:10.1370/afm.983 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2713155/#

In May 2018, the average estimated resident population in NSW, as reported by the Australian Bureau of Statistics, was about 8.05 million [4]. Using this figure, the estimated anaesthesia-related mortality rate was approximately 36 deaths per million population per annum. The estimated mortality directly caused by the anaesthetic was one death per million population per annum.

There were approximately 688,000 individual episodes of anaesthesia care recorded at all public and private hospitals in NSW during 2018 [5]. Using this figure, the estimated anaesthesia-related mortality was 1:19,000 procedures and the estimated mortality directly caused by anaesthesia was 1:76,500 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 2018 was 1:45,900 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 as not unexpected deaths, but the current classification does not highlight this fact.

Under the *NSW Coroner's Act 2009* a reportable death is where *"the person died in circumstances where the person's death was not the reasonably expected outcome of a health-related procedure carried out in relation to the person".*

However, the Committee feels it is necessary to encourage over-reporting from the health system so they are able to continue reviewing all anaesthetic deaths that occur 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 New South Wales.

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 it recurring.

[4] Australian Bureau of Statistics, 2016, Estimated Resident Population, States and Territories, 3101.0 - Australian Demographic Statistics, December Quarter 2018
https://www.abs.gov.au/ausstats/abs@.nsf/0/D56C4A3E41586764CA2581A70015893E?Opendocument

[5] This figure was obtained from the System Information and Analytics Branch, NSW Ministry of Health. It does not include episodes of local anaesthesia or anaesthesia used as a nerve blocking agent.

1. Ministerial Committee

The NSW Special Committee Investigating Deaths Under Anaesthesia (SCIDUA) is an expert committee established 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 for Health appoints members to the Committee for a term of five years. 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 are invited from the Australian and New Zealand College of Anaesthetists (ANZCA), the Australian Society of Anaesthetists and academic departments of anaesthesia.

1.1 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, 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.

We would like to see a notification of deaths occur as soon as possible after the event. The main reason is that the memory of the event is still fresh in the practitioner's mind and small details are still being retained which can aid in the analysis of an unfortunate outcome.

1.2 Legislative Protection and Confidentiality

The Committee is afforded special privilege under section 23 of the *Health Administration Act 1982*. This legislation makes it an offence for a person who obtains information in connection with the work of the Committee to disclose the information without obtaining the proper authorisation. In doing so, it is vital to preserve anonymity.

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.

Permission was sought from each practitioner to share their cases in this report to assist in the prevention of future deaths under anaesthesia. SCIDUA would like to extend its gratitude to those generous practitioners.

1.3 Notifying Deaths to SCIDUA

The notification of deaths arising after anaesthesia or sedation for operations or procedures is a mandatory requirement in New South Wales, regardless of whether the case proceeded for Coronial investigation. Public Health Organisations use the Death Review Database to assist them to classify deaths that meet the criteria requirements for SCIDUA.

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 emailing a completed State Form (SMR010.511): *Report of death associated with anaesthesia/sedation* (**Appendix A**) to: CEC-SCIDUA@health.nsw.gov.au using a method of secure file transfer.

With the recent increase in non-invasive procedures being undertaken by both physicians and radiologists, we have clarified the need for reporting of these cases. If local anaesthetic alone was administered to enable the procedure to be undertaken, there is no need to report this death to SCIDUA. If, however, any sedative agent was concurrently used, then this is considered a reportable death.

It is hoped that an online method of reporting will be established in the near future. Cases may also be referred to SCIDUA by the CEC's Patient Safety Team and the Collaborating Hospitals' Audit of Surgical Mortality (CHASM) Program, if there is concern that anaesthesia may have been a factor in a patient's death.

1.4 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 (**Appendix B**).

The questionnaire is always sent if there is any suspicion that 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. 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 information collected from the form of notification, questionnaire and triage sub-committee and Committee meetings. The CEC is responsible for data management, ensuring accurate reporting, interpretation and verification of anaesthesia-related death data.

1.5 System of Classification

SCIDUA cases are classified using a system agreed upon by the ANZCA Anaesthesia Mortality Sub-committee in 2006, as detailed in Appendix C.

Group A contains deaths where anaesthetic factors are thought to have played a role. The intention of the classification is not to apportion blame on individual cases, but to establish the contribution of the anaesthesia factors to the death. There are three categories:

- Category 1 - Deaths primarily due to anaesthetic factors
  - Where it is reasonably certain that death was caused by the anaesthesia or other factors under the control of the anaesthetist
- Category 2 - Deaths where anaesthetic factors may have played some role
  - Where there is some doubt whether death was entirely attributable to the anaesthesia, or other factors under the control of the anaesthetist
- Category 3 - Where both surgical and anaesthetic factors were thought to have attributed to the death

Group B has three categories of death where anaesthesia is thought to have played no part:

- Category 4 - Surgical deaths
  - Surgical death where the administration of the anaesthesia is not contributory and surgical or other factors are implicated
- Category 5 - Inevitable deaths (with or without surgery)
  - Inevitable death, which would have occurred irrespective of anaesthesia or surgical procedure
- Category 6 - Incidental deaths, where the cause was unrelated to the surgery or anaesthetic
  - 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

Group C identifies 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
  - Those that cannot be assessed, despite considerable data, but where the information is conflicting or key data is missing
- Category 8 is for cases which cannot be assessed as the available data is inadequate

The Committee understands that this classification system has its limitations; however, it is a universal system used by all states of Australia. There are some instances when the patient's disease or condition is the main contributing factor to the patient's death, particularly as proceduralists now operate on older, sicker patients.

On occasion 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 the critical incident, as contributing factors.

In these situations cases are often classified as Category 3GH (the anaesthetic, surgery and significantly the patient's own serious medical condition, were factors that contributed to the death), yet the Committee was satisfied with the anaesthetic and surgical management.

During the 2018 reporting period a total of 290 cases were reviewed by the Committee using this system of classification. Distribution of deaths to category is shown in the table below.

Table 1: Distribution of classified deaths (n=290) notified to SCIDUA in 2018.

Death Type	Category	No. of cases
Deaths attributable to anaesthesia	1	4
	2	5
	3	28
Sub Total		**37**
Deaths in which anaesthesia played no part	4	13
	5	224
	6	4
Un-assessable deaths	7	5
	8	7
Sub Total		**253**
Grand Total		**290**

1.6 Surgery and urgency

The Committee classifies the timing of surgery into the four categories listed below:

- **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.

The Committee found that *urgent non-emergency* surgery accounted for the majority of anaesthesia-related deaths (78%, n=29), with most cases being orthopaedic.

Scheduled surgery accounted for six (16%) of the cases performed in anaesthesia-related deaths, with only two (5%) of the operations performed as an emergency.

Orthopaedic surgery was performed in more than half of all anaesthesia-related deaths (56%, n=21). Other types of surgery performed had small numbers and included non-invasive procedural, vascular operations, ENT / Head and Neck, abdominal, cardiothoracic and urological operations.

1.7 Reporting

SCIDUA communicates with its key stakeholders in the following manner:

- Each individual anaesthetist who provides information to the Committee receives a letter from the Chairperson explaining the reasons behind the Committee's views on their case
- A special report for the preceding calendar year is provided to the Minister
- This year the Committee provided data to the ANZCA Mortality Sub-committee, which produces the triennial report on the 'Safety of Anaesthesia: A review of anaesthesia-related mortality reporting in Australia and New Zealand (2015-2017)'.

The 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 Chairman and members provide presentations at various forums throughout the year. This encourages candid conversations concerning clinical management and communication that enables SCIDUA to consider these points of view with a patient safety focus.

In addition, the Committee periodically 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.

2. Overview of Committee Activity

The Committee met five times in 2018 and, together with the triage sub-committee, reviewed 348 cases. As has been noted in some past reports, not all deaths reviewed occurred in the reporting year. Cases are reviewed as soon as possible after the information is made available to the Committee.

In 2018, only 183 deaths occurred that year, with 100 occurring in 2017, and 7 in 2016. So the majority of cases classified by the Committee were deaths that occurred in the same reporting year, or the preceding year.

Table 2: Summary of cases reviewed (n=348) and classified (n=290) by SCIDUA in 2018.

Activity	No. of cases
Reviewed by triage	291
Reviewed by the committee	57
Total cases reviewed	**348**
Classified by triage	235
Classified by the committee	55
Total cases classified	**290**

Each year there are some cases that are notified to SCIDUA but 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. This may be because the doses of drugs used were trivial or given during resuscitation efforts.

2.1 Anaesthesia-Related Deaths – Group A Deaths

2.1.1 Category 1 and 2 Deaths

The cases of greatest interest to the Committee are those where anaesthetic factors are thought to be the main contributor to the death being "primary anaesthetic deaths". There were four Category 1 cases assessed by the Committee in 2018.

Example Case 1 – Gynaecological Surgery

A 70 year old female who presented for vaginal hysterectomy.

Background History: Hypothyroidism and Smoker.

Anaesthetic Details:

Midazolam 2mg and then induced with Propofol and Remifentanil target controlled infusion. She was paralysed with Vecuronium.

Bag mask ventilation was easy. Initial laryngoscopy revealed an unexpected grade 3 view. A bougie was used and patient intubated blindly. There was no end tidal CO^2 so the endotracheal tube was removed.

A second attempt with a bougie was made with tracheal rings felt to be identified and the endotracheal tube railroaded. Some end tidal CO^2 was present but ventilation was difficult. The patient was now bradycardic and hypotensive. This was treated with Metaraminol initially and then Adrenaline boluses. All drug infusions were stopped.

A widespread rash was then noted. The patient continued to deteriorate and six minutes post induction suffered a cardiac arrest. A transthoracic echo done during the arrest showed ventricular standstill and after 60 minutes resuscitation efforts were ceased.

This death was presumed to be due to anaphylaxis, however a tryptase level was not taken.

Example Case 2 – Orthopaedic Surgery

A 70 year old female presented for a femoral nail after a fall.

Background History: Severe chronic obstructive pulmonary disease with a recent exacerbation and moderate pulmonary hypertension, mitral valve replacement and atrial fibrillation.

Given her poor premorbid condition, discussion with the family ensued, deciding she was not for resuscitation in the event of a cardiac arrest.

Anaesthetic Details:

A fascia iliac block was performed under Ketamine sedation (10mg + 10mg). The patient was then turned lateral for a spinal block with 1.5mls Heavy Marcain and Fentanyl 25mcg. She was then transferred to the operating table and positioned.

The patient developed profound bradycardia and hypotension. She was resistant to Atropine, Metaraminol and Ephedrine and then suffered a cardiac arrest. Given her advanced care directive no CPR was initiated.

Learning Points

- High risk patients having high risk surgery feature predominantly in SCIDUA reports
- It is essential to appreciate the magnitude and severity of the patient's co-morbidities (especially cardio-respiratory) prior to undertaking an anaesthetic
- This will guide not just the type of anaesthetic given but also the level of monitoring required for the procedure. While having an arterial line in this patient might not have altered the outcome, perhaps having one would have led to earlier recognition of a deteriorating patient

Example Case 3 – Cardio-Thoracic Surgery

A 50 year old male presented for redo cardiac surgery - aortic root, ascending aorta and arch replacement +/- CABG (Coronary Artery Bypass Grafting).

A very high mortality risk was predicted pre-operatively.

Background History: Multiple cardiac procedures secondary to rheumatic heart disease, immunocompromised with long hospital stay.

Anaesthetic Details:

Premedication with Lorazepam, induction with Midazolam 5mg, Fentanyl 500 mcg and Propofol 20mg. He was paralysed with Pancuronium 12mg.

Intubation was uneventful and under aseptic technique central venous access was obtained – quad lumen central venous catheter (CVC), pulmonary artery catheter and 18F right internal jugular (RIJ) venous cannula. The line insertion was time consuming given the patient's extensive history of multiple cardiac procedures.

After an hour of stable anaesthesia, once all access was obtained, a Vancomycin infusion was started. Almost immediately there was hypotension refractory to adrenaline and noradrenaline. The patient became asystolic and non-responsive to resuscitative efforts. Given his extremely poor pre-operative state he was not considered a candidate for extra corporeal membrane oxygenation (ECMO).

This death was presumed to be due to anaphylaxis, but a tryptase was not taken.

Learning Points

- Anaphylaxis can occur with any drug.
- Even with immediate recognition and treatment (adrenaline and fluids) the outcome can still be poor
- Common agents involved in anaphylaxis events include muscle relaxants, antibiotics, blue dyes and chlorhexidine
- With any suspected anaphylaxis event every attempt should be made to send off a tryptase sample

Example Case 4 – General Surgery

A 50 year old male presenting for laparotomy for small bowel obstruction. He weighed 80kg.

Background History: Gastrectomy and Oesophageal – Jejunal anastomosis. Pre-operatively the patient had abdominal distention with no nausea or vomiting. A nasogastric tube (NGT) was advised against by the surgical team given the patient's prior surgery.

Anaesthetic Details:

Modified rapid sequence was undertaken with Midazolam 3mg, Fentanyl 100mcg, Propofol 130mg and Rocuronium 50mg.

Almost immediately a large volume (> 1L) of gastric fluid regurgitated into the patient's mouth. He was turned lateral and suctioned. He was intubated in the lateral position, and a y-suction catheter used prior to ventilation. There was significant soiling of the trachea with gastric contents.

The case was undertaken on 100% oxygen, arterial and central venous access was obtained. By the end of the case the patient was noted to be in pulmonary oedema and requiring inotropic support. His ventilation was becoming increasingly difficult and was transferred to another facility for consideration of extra corporeal membrane oxygenation.

His condition unfortunately worsened over the next day and he died.

Learning Points

- The Committee continues to see aspiration events contributing to death. While aspiration events can be unpredictable, this patient was at risk
- A rapid sequence induction was indicated in this case. If suxamethonium was deemed unsuitable to be used in this patient, a recommended dose of 1.2mg/kg of Rocuronium should have been used

2.1.2 Category 3 Deaths

It is important to realise that there are two sub-sets of anaesthesia-related death, those with (i) a correctable factor and those with (ii) no correctable factor. Correctable factor case are those in which the anaesthetic management could have been improved with possibly a better outcome. Cases with no correctable factor are where the Committee could not suggest any way in which alternative management could have averted the fatal outcome.

Table 3: Summary of case distribution classification according to subcategory for 2018.

Causal or contributory factors	Frequency count
A - Pre-Operative	5
Ai Assessment	5
Aii Management	0
B - Anaesthetic technique	5
Bi Choice or application	0
Bii Airway maintenance	4
Biii Ventilation	1
Biv Circulatory support	0
C - Anaesthesia drugs	5
Ci Selection	0
Cii Dosage	3
Ciii Adverse event	2
Civ Inadequate reversal	0
Cv Incomplete recovery	0
D - Anaesthetic management	5
Di Crisis management	0
Dii Inadequate monitoring	4
Diii Equipment failure	0
Div Inadequate resuscitation	1
Dv Hypothermia	0
E - Post-Operative	0
Ei Management	0
Eii Supervision	0
Eiii Inadequate resuscitation	0
F - Organisational	2
Fi Inadequate supervision or assistance	1
Fii Poor organisation	0
Fiii Poor planning	1
G - No correctable factor	24
H - Medical condition of patient a significant factor	35

Note: The frequency counts add up to more than 37, because some anaesthesia-related deaths have more than one factor identified.

No Correctable Factor Identified – Subcategory G

This subcategory is used where death was due to anaesthesia factors, but no better technique could be suggested.

In 2018, 65% (n=24) of deaths were classified as being 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. The Committee was satisfied with the anaesthetic management for these cases, 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 reassures us of the high level of care being delivered by anaesthetists in NSW health facilities.

Example Case 5 – Orthopaedic Surgery

A 90 year old female presenting for an open reduction and internal fixation of the neck of femur fracture.

Background History: Dementia and moderate aortic stenosis. Preoperative discussion with the family and intensive care deemed her not suitable for high dependency care post operatively.

Anaesthetic Given:

An arterial line was inserted and the patient positioned laterally under Ketamine and Fentanyl sedation for a combined spinal / epidural. She was noted to be hypotensive and treated with fluid and Metaraminol.

Once she had stabilized a CSE was performed using 1.2mls of Heavy Bupivacaine. Surgical anaesthesia was achieved and the case commenced with Propofol sedation.

She had an uneventful procedure requiring no vasoconstrictors, recovery was unremarkable and was transferred to the ward. The next morning she was drowsy but rousable. A low urine output was noted. She became hypotensive a few hours later and then became unresponsive and died.

Learning Points

- The anaesthetic management of these high risk patients can be quite difficult. Unfortunately even with the best of medical care death can still occur

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Anaesthesia Related with Correctable Factor

The Committee classified 35% (n=13) of cases as having correctable factors in the anaesthetic management. For some deaths, multiple factors were ascribed. These factors were identified as follows:

- inadequate pre-operative assessment (n=5)
- inadequate airway maintenance (n=4)
- inadequate monitoring (n=4)
- inappropriate drug dosage (n=3)
- adverse event (n=2)
- poor planning (n=1)
- inadequate ventilation (n= 1)
- inadequate supervision or assistance (n=1).

Note: The frequency counts add up to more than 14, because some deaths have more than one factor identified.

Inadequate pre-operative assessment – Subcategory A(i)

This subcategory is used where the death may involve failure to: (i) take an adequate history, (ii) perform an adequate examination, (iii) undertake appropriate investigation or consultation, or, (iv) make adequate assessment of the volume status of the patient in an emergency.

In 2018, the Committee identified five cases where inadequate pre-operative assessment was considered a factor in the patient's death.

Example Case 6 – Orthopaedic Surgery

A 75 year old male with neck of femur fracture post syncopal episode.

Background History: Ischemic heart disease – Coronary stents in 2010 and 2014, left ventricular ejection fraction of 30%, Atrial Fibrillation, peripheral vascular disease – abdominal aortic aneurysm graft and coeliac artery stent.

Preoperative ECG showed evidence of ischaemia with new ST Depression and T wave inversion. The troponin was elevated at 153. The case was discussed with a cardiologist who deemed this to be unlikely due to a Non ST elevation myocardial infarction.

Anaesthetic Details:

In the operating theatre a fascia Iliaca block was performed, an arterial line inserted and patient induced with Propofol 30mg, Ketamine 50mg. The patient was intubated. During the case a Metaraminol infusion was run and patient tolerated the procedure well and was extubated at the end.

In recovery the patient was noted to be tachycardic and hypotensive (Systolic blood pressure was 90). The patient's haemoglobin was 81. He was given a blood transfusion and fluids. He was transferred to the intensive Care Unit (ICU) 8 hours post procedure.

In ICU he complained of chest pain, he was given Aspirin and Clopidogrel. Soon after he required Noradrenaline to maintain his blood pressure. Ongoing deterioration occurred over the next few hours, leading to decreased level of consciousness. The patient was intubated but shortly after suffered a broad complex rhythm and died.

Learning Points

- This was an elderly frail patient with a known history of cardiac disease who had new ECG changes and a troponin rise. His syncopal event / fall might have been due to a primary cardiac event or perhaps he suffered a secondary ischaemic event
- Either way, this should have indicated a need to delay surgery until a critical cardiac event had been excluded and the patient stabilised

Inadequate airway maintenance – Subcategory B(ii)

This subcategory is used where there is: (i) an inappropriate choice of artificial airway, (ii) failure to maintain or provide adequate protection of the airway, or (iii) failure to recognise misplacement or occlusion of an artificial airway.

The Committee identified four cases where inadequacy of airway maintenance was considered a factor in the patient's death. In all four cases pulmonary aspiration occurred as a complication.

Example Case 7 – General Surgery

An 85 year old female admitted with small bowel obstruction.

Background History: Paroxysmal atrial fibrillation, previous bowel resection (due to bowel perforation) and asthma.

Anaesthetic Details:

The plan was for a rapid sequence induction with Rocuronium with the senior resident medical officer to attempt intubation.

IV Access and arterial line placed prior to induction. Fentanyl 100mcg, Propofol 50mg and Rocuronium 50mg were given. On initial laryngoscopy fluid was noted in the oropharynx. The consultant anaesthetist took over, suctioned the airway and intubated the patient.

The case proceeded with resection of the small bowel. During the case oxygenation was becoming more difficult to manage (oxygen saturations were 95% on a fraction of inspired oxygen of 0.7). The case was completed and a decision made to extubate the patient and transfer them to the High Dependency Unit (HDU).

In HDU there was ongoing deterioration. The patient initially required continuous positive airway pressure (CPAP) and then intubation.

The patient died 7 days later. Intraabdominal sepsis featuring predominantly.

Learning Points

- While it is appropriate for junior medical staff to attempt to secure airways in emergency cases, this should be on a case-by-case basis determined by the consultant at the time. While not suggesting that the outcome should have differed in this case should this have occurred, it is worth reflecting upon
- If suxamethonium is deemed unsuitable for a particular patient, then the recommended dose for a rapid sequence induction with Rocuronium is 1.2mg/kg
- Extubation of a patient having emergency major abdominal surgery in the setting of regurgitation / aspiration / difficult intraoperative ventilation should be considered carefully. A direct ICU admission might be the more prudent course of action

Inadequate ventilation – Subcategory B(iii)

This subcategory is used where the death is caused by failure of ventilation of the lungs for any reason. This includes inadequate ventilator settings and failure to re-institute proper respiratory support after deliberate hypoventilation (e.g., bypass).

Only one case was identified where there were problems with the ventilation technique.

Example Case 8 – Endoscopic Procedure

In this case a patient with serious co-morbidities having an endoscopic procedure was inadequately ventilated intra-operatively. This was not immediately detected due to the use of a high flow oxygen delivery system.

Learning Points

- High flow nasal oxygen delivery systems should not be seen as an impenetrable suit of armour; like any other form of therapy they should be used with their limitations in mind.
- Please be vigilant when using such systems, as deterioration will not be picked up immediately and by the time it is apparent the patient has already reached the limits of their ability to compensate.
- The efficacy of high flow systems are predicated on having an open airway. The benefits of using such systems is lost when a patient becomes obstructed. It is imperative that the patient is continuously observed for obstructive events while it is being used and corrected immediately if identified
- A desaturation while on high flow systems should be treated as an emergency and a plan should be in place prior to commencing the case as to how to best deal with such an event, as deterioration will occur rapidly once desaturation occurs

Inappropriate drug dosage – Subcategory C(ii)

This subcategory is used where there may be incorrect dosage, absolute or relative to the patient's size, age and condition, and in practice is usually an overdose.

The Committee identified three cases where the dosage of anaesthetic/sedative drugs was considered a factor in the patient's death. Although the dose of drug used might frequently be an adequate and appropriate dose for other patients, the Committee considered that a dose-related event occurred in these three deaths.

Pre-operative assessment of the patient's age and underlying medical condition needs to be considered to avoid over-dosage.

Example Case 9 – General Surgery

A 60 year old male presenting for colonoscopy for investigation of abdominal pain to rule out Diverticular disease.

Background History: Ischemic heart disease with coronary grafts in 1992 and angioplasties in 2001 and 2009, Type 2 diabetes and gastro oesophageal reflux. He was seen by his cardiologist 3 months earlier. Dual antiplatelets were ceased 1 week prior to procedure.

Anaesthetic Given:

A Hudson mask was placed and the patient positioned in the left lateral position with standard monitoring. Sedation was provided with Alfentanil 250mcg and Propofol target control at 4mcg/ml. The case commenced with Propofol target ranging between 4-7mcg/ml.

About eight minutes into the procedure the patient had abdominal pressure applied to assist the proceduralist, it was then noted that some yellow fluid was being regurgitated into the Hudson mask. The patient was suctioned, anaesthesia deepened and the procedure continued. After ten minutes the patient started to slowly desaturate. The procedure was terminated.

The patient was taken to recovery awake and maintain saturations of 6L via Hudson mask. Chest auscultation revealed crepitation in the lower lung fields.

He went on to develop chest pain. His ECG was not diagnostic of ischaemia. A cardiology registrar attended and ordered serial troponins and an admission.

A few hours later the patient experienced another episode of chest pain accompanied with hypotension. A Medical Emergency Team (MET) call was made and the patient was intubated and transferred to the Cath Lab. Angiography revealed a left anterior descending artery (LAD) lesion which was not able to be revascularised.

The patient died 6 hours post colonoscopy.

Learning Points

- Anaesthetists should be mindful of the loss of airway reflexes associated with sedation and anaesthesia. Deep levels of sedation with no protective artificial airway may leave a patient vulnerable to aspiration events
- Endoscopic procedures do not require deep levels of sedation
- A suspected aspiration event during any case, whether elective or emergency, should be treated immediately
- The decision to intubate the patient or wake the patient after the first event is at the discretion of the treating anaesthetist for the case
- The decision to continue the procedure when performing it for non-life threatening indications is not advocated

Inadequate monitoring – Subcategory D(ii)

This subcategory is used where there is failure (i) to observe minimum standards as enunciated in the ANZCA professional documents, or (ii) to undertake additional monitoring when indicated, e.g., use of a pulmonary artery catheter in left ventricular failure.

The Committee identified four cases where inadequate monitoring was considered a factor in the patient's death. A case example is provided on the next page.

Example Case 10 – Orthopaedic Surgery

A 75 year old with fractured neck of femur post fall.

Background History: Ischemic heart disease with severe pulmonary hypertension, congestive cardiac failure, atrial fibrillation, multiple cerebrovascular accidents and renal impairment.

Anaesthetic Details:

Induction with Midazolam 1mg, Ketamine 20mg, Fentanyl 50mcg and Propofol 20mg and paralysed with Rocuronium 50mg. The patient was intubated for procedure.

Early anaesthesia was tolerated well with Metaraminol infusion running at 10mls/hr.

Post insertion of gamma nail there was a sudden drop in oxygen saturations and drop in end tidal carbon dioxide.

Blood pressure was 50/39 on the non-invasive blood pressure monitor. Metaraminol and Ephedrine boluses given with no effect. Then there was a loss of cardiac output.

CPR was commenced with return of cardiac output. No Adrenaline was given. Discussion with family occurred and palliative measures instituted.

Learning Points

- Given this patient's extensive medical problems, an arterial line prior to the procedure commencing would have been warranted
- While having an arterial line would not have prevented this problem from occurring it would have led to earlier detection of cardiovascular instability, have led to increased or timelier efforts to manage the problem and helped guiding resuscitative measures

Poor planning

The Committee identified one case where poor planning was considered a factor in the patient's death. The case in question was a last minute addition to an elective operating list.

The operation planned was quite extensive in nature. This allowed very little time for planning of the anaesthetic and, in hindsight, should have been delayed for appropriate assessment to be undertaken prior to embarking on such an extensive procedure.

Deaths associated with cemented hip arthroplasty

There were five cases where the Committee considered the cause of death was related to bone cement. All of those deaths were classified as anaesthesia/sedation related, but with no correctable anaesthetic factors. The urgency of these operations was classified as urgent non-emergency. Analysis for this suffix code shows a 66% decrease from 2017 (n=15).

There were other cases where bone cement (polymethyl methacrylate) might have been used, but the Committee agreed that the factors involved in those deaths were not typical bone cement implantation syndrome.

Bone cement implantation syndrome (BCIS) is a rare and potentially fatal perioperative complication of cemented bone surgery. Clinically, it can be as benign as transient desaturation or mild hypotension. In its more severe presentation, BCIS can cause serious cardiac dysrhythmias and cardiac arrest, and in cemented hemiarthroplasty for femoral neck fracture, BCIS may carry up to a 16-fold increase in 30-day postoperative mortality[6].

[6] https://www.aana.com/docs/default-source/aana-journal-web-documents-1/understanding-bone-cement-implantation-syndrome-december-2018.pdf?sfvrsn=ec2a56b1_4

2.1.3 Category 4 Deaths

Deaths associated with haemorrhage

There were four cases where death was thought to be due to uncontrolled haemorrhage as a complication of the patient's disease process or the surgery. This is a 56% decrease from 2017 (n=9). The Committee was satisfied with the anaesthetic management in every case.

Example Case 11 – Orthopaedic Surgery

A 60 year old female presented for Posterior Interbody Fusion (L4/5) for spondylolisthesis.

Background History: Chronic obstructive pulmonary disease with poor exercise tolerance (walking frame dependant), chronic opioid use, peripheral vascular disease, and Type 2 diabetes.

Anaesthetic details:

The patient was admitted to hospital two days prior to the procedure for medical optimisation. On the day of the procedure an arterial line was placed and she was induced, intubated and positioned prone for the procedure. Spinal cord monitoring was being used so the patient received Propofol and Remifentanil infusions for maintenance of anaesthesia.

After 90 minutes into the procedure there was sudden hypotension (blood pressure 80/40). This was related to the placement of a pedicle screw. This was treated with fluids and Metaraminol.

The wound was closed and the patient was transferred to the angiography suite for investigation of concealed blood loss.

The angiogram revealed disruption of the inferior venae cava (IVC).

The patient was transferred back to the operating theatre for a laparotomy and repair of the IVC. Over the next three hours attempts were made to repair the IVC. The anaesthetist transfused 27 units of blood, 10 units fresh frozen plasma and 22 units of cryoprecipitate.

The IVC disruption was too complex to repair and further surgical attempts were abandoned.

The patient died one hour later.

Learning Points

- Despite early identification of a potential problem, the availability of an on-site radiology facility, and vascular surgeon, this case of surgical misfortune was not correctible
- The teamwork demonstrated between the anaesthetists, surgeons and nursing staff involved in this complex case was commendable

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2.2 Non-Related Anaesthesia Deaths – Group B Deaths

2.2.1 Category 5 Deaths

Inevitable Deaths

These are cases where the patient's disease or injury made recovery impossible, despite competent anaesthesia and surgery. In these instances death was considered inevitable.

In 2018, the majority of cases (77%, n=224) reviewed by the Committee were classified as having no anaesthetic or surgical factors involved and were therefore inevitable deaths.

Nearly all inevitable deaths (92%, n=207) were ASA grade 4 or 5, being critically unwell or not expected to survive for 24 hours, with most being patients aged 65 or over (65%, n=136)

Example Case 12 – Urological Procedure

A 90 year old male presented for emergency cystoscopy and bladder washout.

Background History: Admitted to hospital a few days prior with a Non ST elevation myocardial infarct and pulmonary oedema. This was further complicated with acute kidney injury and cardiogenic shock. Attempted urinary catheterisation by an urologist was traumatic and unsuccessful.

Anaesthetic details:

The patient was transferred to theatre with multiple inotropes running (Dobutamine and Levosimendan). An Arterial line was insitu. A Spinal anaesthetic was given – 1ml Heavy Marcain. No sedation was concurrently used.

The surgery proceeded and total operative time was 1 hour. A 3-way irrigating catheter was placed for continuous bladder washout of clots. The patient was then transferred back to the intensive care unit.

Over next few hours the patient became increasingly hypotensive and not responding to escalation of inotropes. The patient died 5 hours post procedure.

Learning Points

- Patients like these who are critically unwell requiring procedures, are likely to succumb to their illness in the near future. The "best" anaesthetic chosen in these patients is the one that the anaesthetist is most familiar and comfortable with
- There is no criticism of technique or eventual outcome in these situations

Further analysis on the inevitable deaths reviewed by the Committee identified that these cases were distributed across several surgical specialties and non-invasive procedural areas, as demonstrated in the figure below.

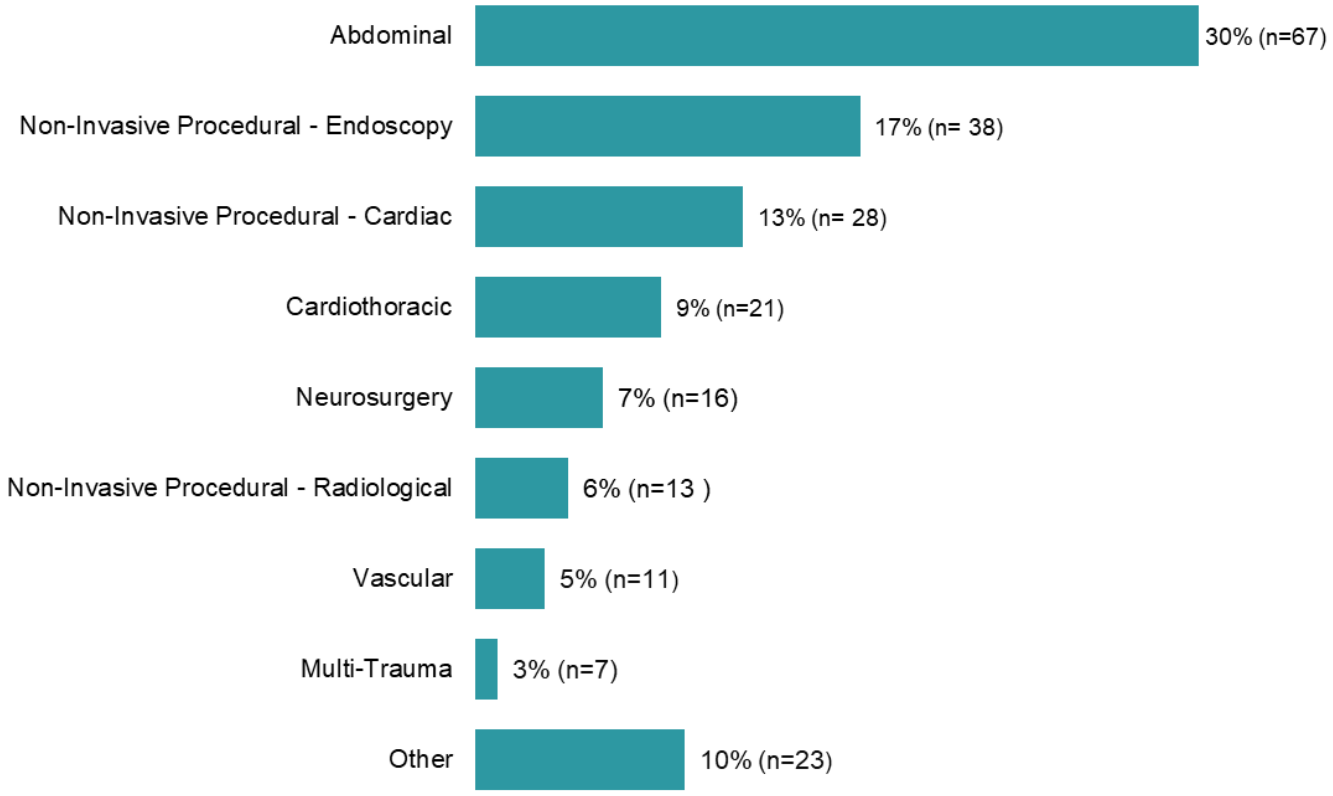


Figure 1: Specialty distribution for inevitable deaths determined by SCIDUA in 2018 (n=224)

Note: The grouping 'Other' includes: General (Non-Abdominal); Resuscitation; Orthopaedic; Urology; Other – Nil; Non-Invasive – Procedural; ENT / Head and Neck.

Non-Beneficial Surgery (Futile Surgery)

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 13 such cases in 2018, with 77% (n=10) classified as emergency procedures. There were no deaths classified by the Committee as futile surgery for the urgency type 'scheduled' (elective surgery).

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. Surgery in obvious and futile circumstances denies the patient good palliative care.

2.3 Deaths not able to be Assessed – Group C Deaths

There were 12 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 adequately assess them, mainly due to the lack of reporting information.

Medical Practitioners involved in cases where the patient has died should endeavour to report these events to SCIDUA at their earliest convenience to enable more accurate recall.

Example Case 13 – Vascular Surgery

An 80 year old male scheduled for Superficial Femoral Artery Angioplasty.

Background History: A patient with vascular disease and ischaemic heart disease, previous coronary grafts, hypertension, peripheral vascular disease, atrial fibrillation and chronic renal failure.

Anaesthetic Details:

The patient had the procedure performed with local anaesthetic and sedation. Midazolam 1mg, Fentanyl 25mcg and Propofol Target control (0.5-1 mcg/ml) given for procedure. Cefazolin and Heparin given during the case.

The case was uneventful and upon completion the patient was sent via recovery to the ward.

Eight hours later (early hours of the following morning), the patient was found by nursing staff unconscious and in asystole.

Cardiopulmonary resuscitation (CPR) was commenced. Arterial blood gases taken during resuscitation showed a pH 7.01, Potassium 5 and a Lactate 9. Despite multiple cycles of CPR, there was no return of spontaneous output.

No post mortem was performed.

Learning Points

- Cases such as these are difficult to analyse and categorise. The patient had recovered completely from their anaesthetic but suffered another event during the post-operative period. Perhaps it was a primary cardiac event? Perhaps a thromboembolic event?
- Given the paucity of data in the lead up to that event (as no one was observing the patient immediately prior) and the fact that no post mortem exam was carried out, it is impossible to say what caused this patient's death

2.4 Overview of Anaesthesia Related Deaths

2.4.1 Anaesthetists and anaesthesia

The grade of anaesthetist and the type of anaesthesia used also contributes to the outcome.

- Most anaesthesia-related deaths (n=31) reviewed by the Committee in 2018 had a general anaesthetic administered either by a specialist anaesthetist or by trainees with close supervision by a specialist anaesthetist
- 15 had a regional type of anaesthesia administered by a specialist anaesthetist
- Sedation was reported in three deaths. In all of these cases the sedation was administered by a specialist anaesthetist
- Anaesthesia was administered by a trainee anaesthetist in three of these deaths

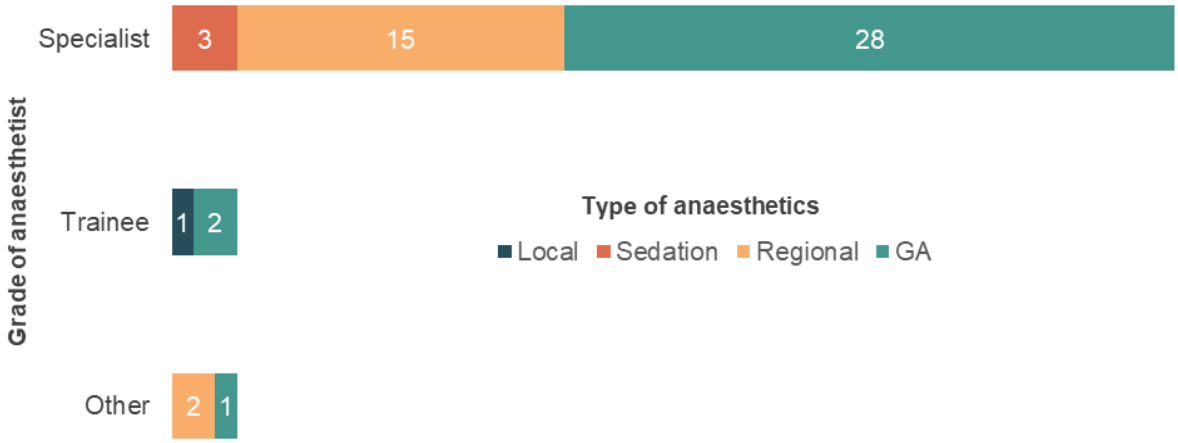


Figure 2: Frequency distribution of anaesthesia-related deaths (n=37) for 2018 by grade of anaesthetist and type of anaesthetic/s administered

Note: The frequency counts add up to more than 37, because some anaesthesia-related deaths have more than one type of anaesthetic

2.4.2 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 2018, the Committee reviewed 62 deaths that occurred in the operating theatre or procedural room, and determined that only 21% (n=13) of deaths were classified as being anaesthesia-related. Four deaths were classified as unassessable
- The Committee also considered that death was inevitable and outside the control of the surgeon and anaesthetist in 73% (n=45) of deaths in the operating theatre or procedural room. Analysis shows that this is a decrease of 20% against 2017
- The median age of anaesthesia-related deaths in the operating room was 79 years (range: 42-93 years), with 62% (n=8) of patients classified ASA 4 (critically unwell).
- Orthopaedic surgery was performed in approximately 46% (n=6) of these cases, and 23% (n=3) of patients were admitted for cardiothoracic surgery
- The remaining deaths (n=4) occurred for non-invasive endoscopic procedures, abdominal and gynaecological surgeries

The surgery type for 77% (n=10) of anaesthesia-related deaths was classified as urgent non-emergency, meaning that the patient required emergency surgery but had enough time to allow for medical optimisation, e.g., fractured neck of femur.

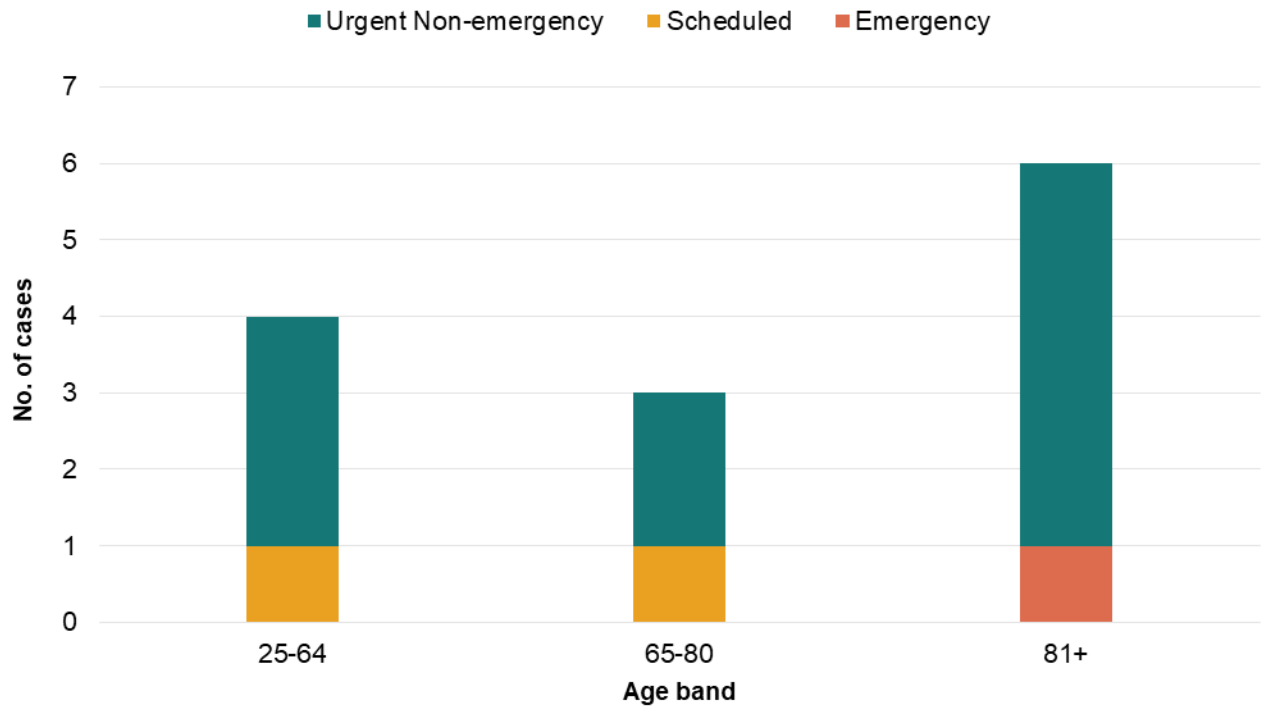


Figure 3: Classified surgery type for anaesthesia-related deaths (n=13) that occurred in the operating theatre for 2018

Table 4: Classification of all deaths (n=62) occurring in the operating theatre or procedural room, as determined by SCIDUA in 2018.

Death Type	Category	No. of cases
Deaths attributable to anaesthesia	1, 2 & 3	13
Deaths in which anaesthesia played no part	4 & 5	45
Un-assessable deaths	7 & 8	4
	Total	**62**

Distribution of males and females for this section are provided on the next page.

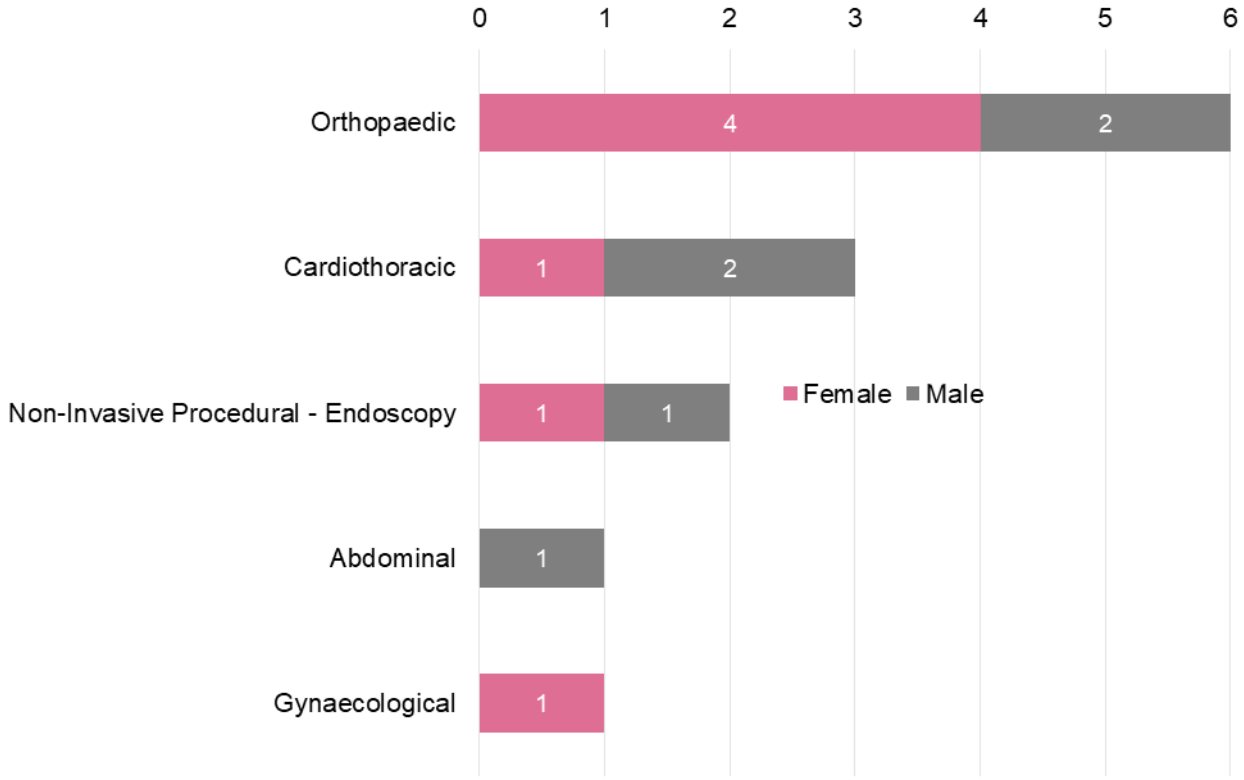


Figure 4: Distribution of sex across surgery specialty for anaesthesia-related deaths (n=13) that occurred in the operating theatre for 2018

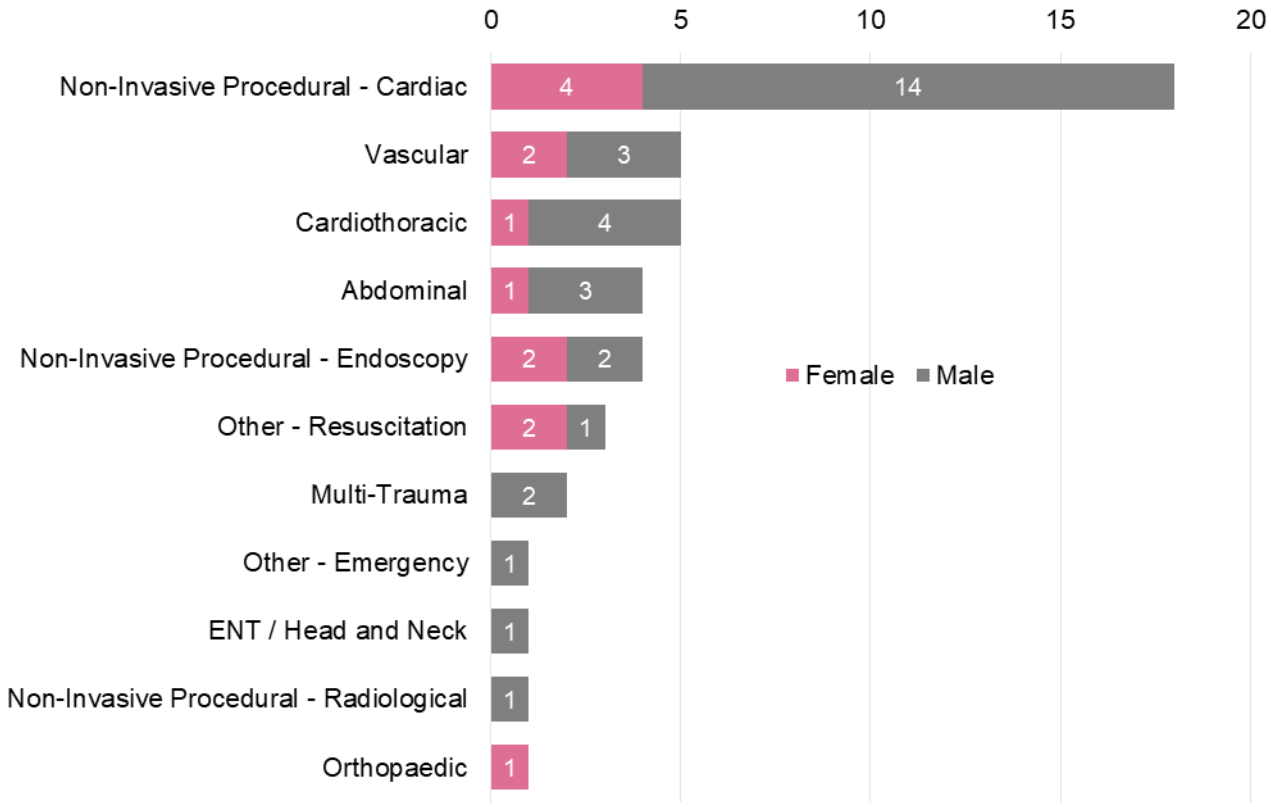


Figure 5: Distribution of sex across surgery specialty for deaths in which anaesthesia played no part (n=45) that occurred in the operating theatre for 2018

2.4.3 Age and sex

Analysis of the anaesthesia-related deaths classified by the Committee in 2018 showed roughly equal numbers of females and males.

- Most patients (81 %, n=30) were aged 65 and over, of which more than half (51%) aged over 81 years (n=19). The age range was 35 years – 101 years

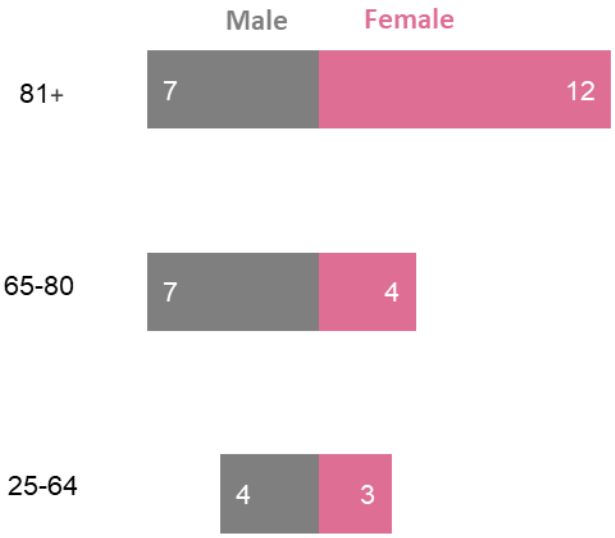


Figure 6: Age and sex distribution for anaesthesia-related deaths (n=37) in 2018

2.4.4 ASA physical status

- Most anaesthesia-related deaths (92%, n=34) were ASA grade 3, 4 or 5. Patients aged over 81 years (n=19) were all classified ASA grade 3, 4 or 5. Anaesthetists are frequently giving anaesthetics to very old and sick patients and anaesthesia poses a significant risk to this group.

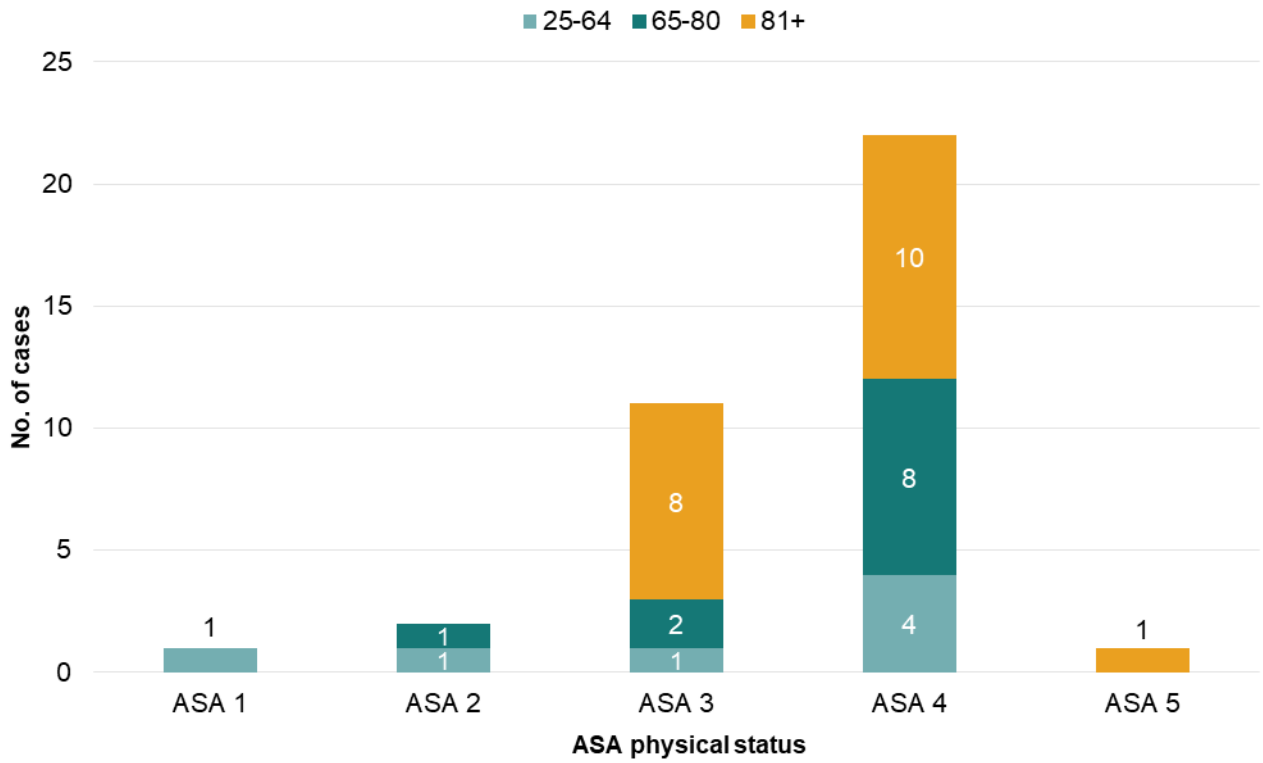


Figure 7: Age distribution against ASA score in anaesthesia-related deaths for 2018 (n=37**)**

ASA Score

The American Society of Anesthesiologists Physical Status Classification score is used to grade patients according to their health, as below:

P-1 (ASA 1) A normal healthy patient
P-2 (ASA 2) A patient with mild systemic disease
P-3 (ASA 3) A patient with severe systemic disease
P-4 (ASA 4) A patient with severe systemic disease that is a constant threat to life
P-5 (ASA 5) A moribund patient not expected to survive without the operation
E Patient requires emergency procedure – usually a trauma admission

(An emergency is defined as existing when delay in treatment of the patient would lead to a significant increase in the threat to life or body part)

2.4.5 Hospitals

SCIDUA classifies hospitals into six levels, using a numerical system based on, but not identical to, the NSW Guide to Role Delineation of Health Services [7].

- The majority of anaesthesia-related deaths (59%, n=22) occurred in Metropolitan Public teaching hospitals which perform higher volumes of complicated surgery
- Seven (19%) occurred in rural public hospitals
- Five (14%) occurred in metropolitan public non-teaching hospitals
- Three (8%) occurred in metropolitan private hospitals

[7] NSW Ministry of Health, 2016, Guide to the Role Delineation of Health Services
http://www.health.nsw.gov.au/services/Publications/role-delineation-of-clinical-services.PDF

Almost all deaths (n=9) in Level 5 hospitals were classified as Category 3 deaths, having both surgical and anaesthetic factors involved. Distribution by hospital type is shown below.

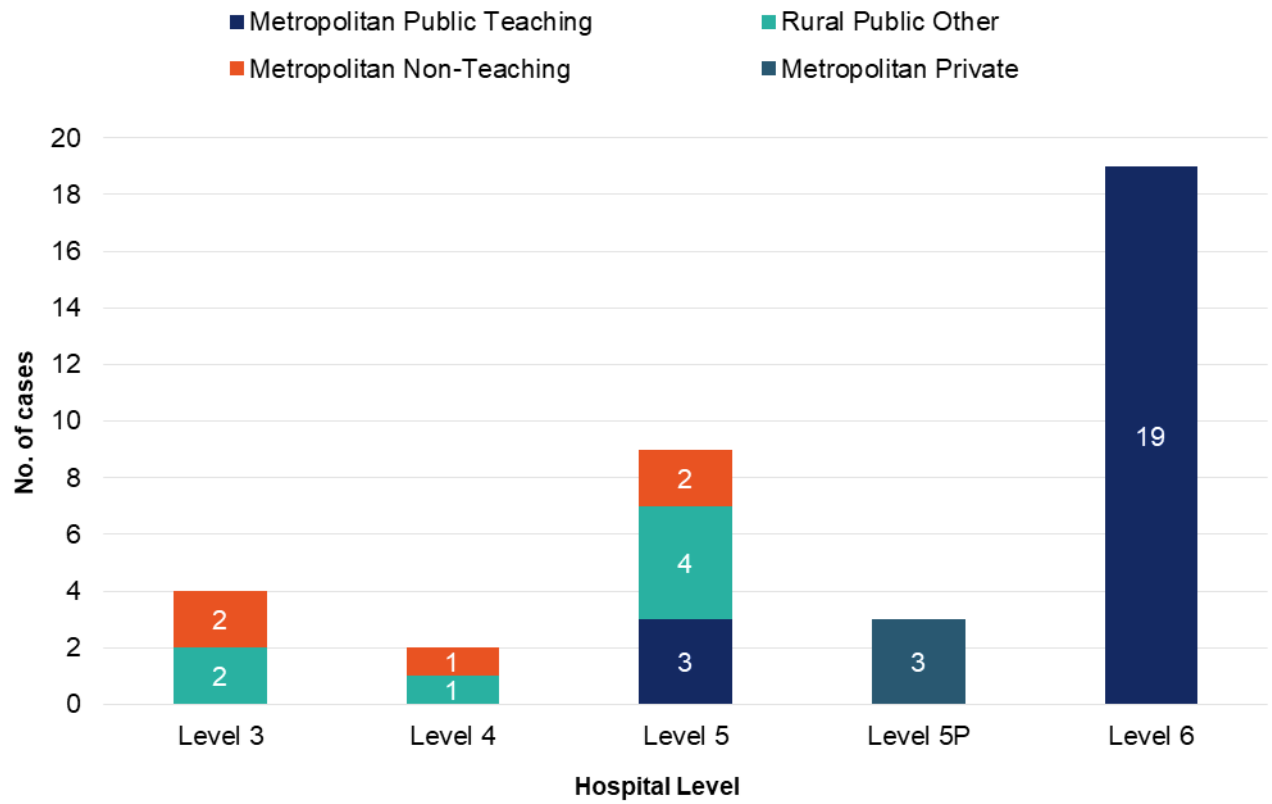


Figure 8: Distribution of anaesthesia-related deaths by hospital type for 2018 (n=37)

Hospital Levels

The classification 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

Note: For institution, hospital or facility that is in regional NSW, the suffix R is added.
For private institutions, hospitals or facilities, the suffix P is added.

2.4.6 Location of Death

In 2018, a total of 37 anaesthesia-related deaths were identified by SCIDUA, of which 23 patients were classified as high-risk, scoring an ASA 4 or ASA 5 on assessment.

As SCIDUA assesses deaths within 24 hours of an anaesthesia or sedative being administered to a patient, it is important to understand where in the hospital the death occurred. In doing so, the point in time within the 24 hour window that the adverse event occurred is able to be determined. Identifying this time period may enable improvements in post-operative care to support better patient outcomes.

- The highest number of anaesthesia-related deaths (n=13) occurred in intensive care units (ICU) or high dependency units (HDU) in 2018.
- This was followed closely by anaesthesia-related deaths in the operating theatre (n=11), and deaths in the general ward (n=10).
- Only one anaesthesia-related death occurred in the recovery room.

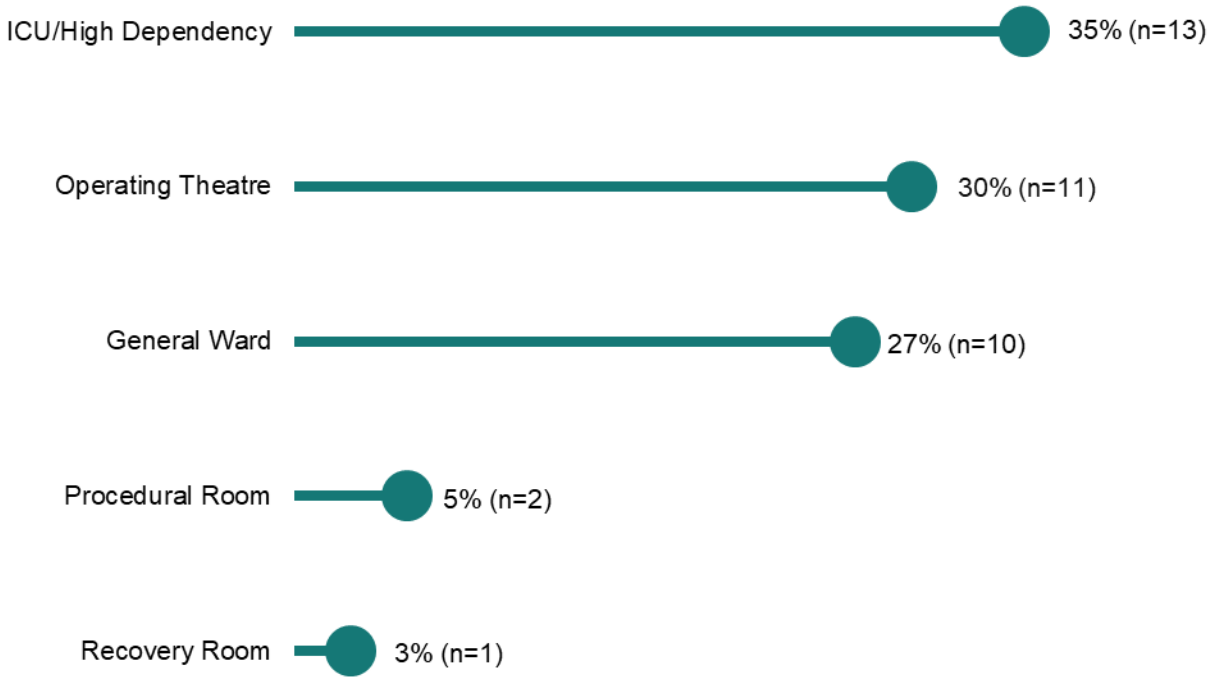


Figure 9: Distribution of anaesthesia-related deaths by location in the hospital for 2018

3. Additional Datasets on SCIDUA Deaths

This section has not previously been produced for the annual SCIDUA Special Report. It examines the notifications to the SCIDUA Program by participating hospitals and practitioners of the deaths that occurred within the calendar year for the period 2015-2019.

It also identify trends in a number of specialty areas and demographic cohorts over the four year period (2015-2019) based on the activities of the Committee.

The overall activity for SCIDUA highlights the small number of private hospitals participating in the Program. In an effort to address this matter, the Chairman issued a letter in August 2019 to all Chief Executive Officers of private health facilities to encourage participation.

3.1 Notifications of Death by Calendar Year

Data depicted in the next four figures is specific to the data extraction on 18 November 2019. It is important to note that submissions to SCIDUA occur almost daily, so this is a point-in-time capture of deaths occurring in the calendar year notified to SCIDUA.

The figure below shows the submission of Forms of Notification (FON) for deaths occurring in the calendar year, over a four year period (2015-2018).

- Number of deaths occurring for the four year period (n=1,349) notified to SCIDUA
- The highest number of notified deaths was in 2017 (n=394)
- The lowest number of notified deaths was in 2015 (n=293)
- Similarly, the lowest number of deaths attributable to anaesthesia determined by SCIDUA was in 2018 (n=27) with the highest in 2015 (n=56)

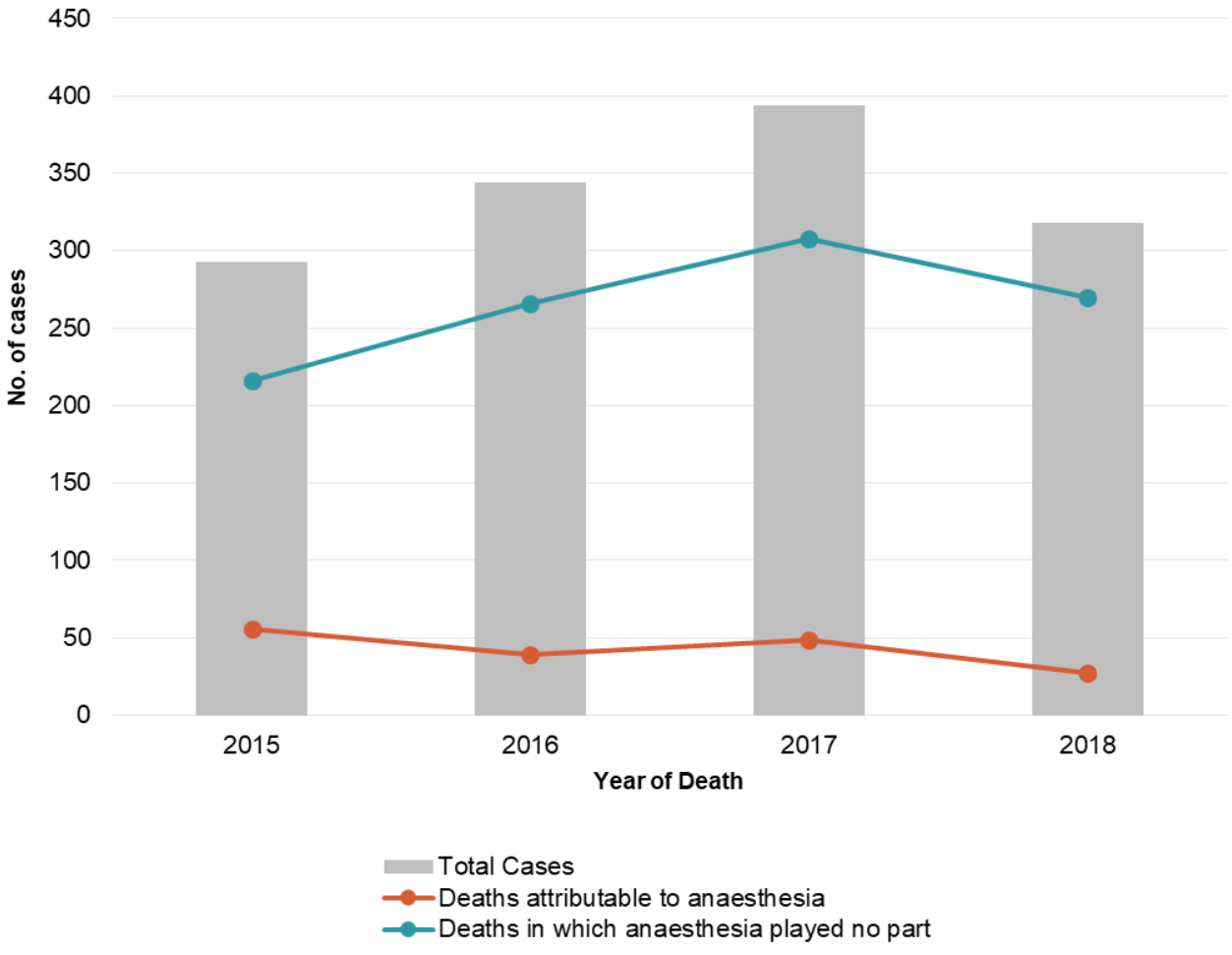


Figure 10: Comparison of deaths occurring for calendar years 2015-18 notified to SCIDUA

Further analysis on the monthly submission of notifications of death for the calendar year (n=1,349) over the four year period (2015-2018) are shown in the figure below.

- The majority of activity for the SCIDUA Program (n=1,277) is based on the deaths that occur in the public health system, with approximately 5.8% of deaths notified by private facilities over the four year period

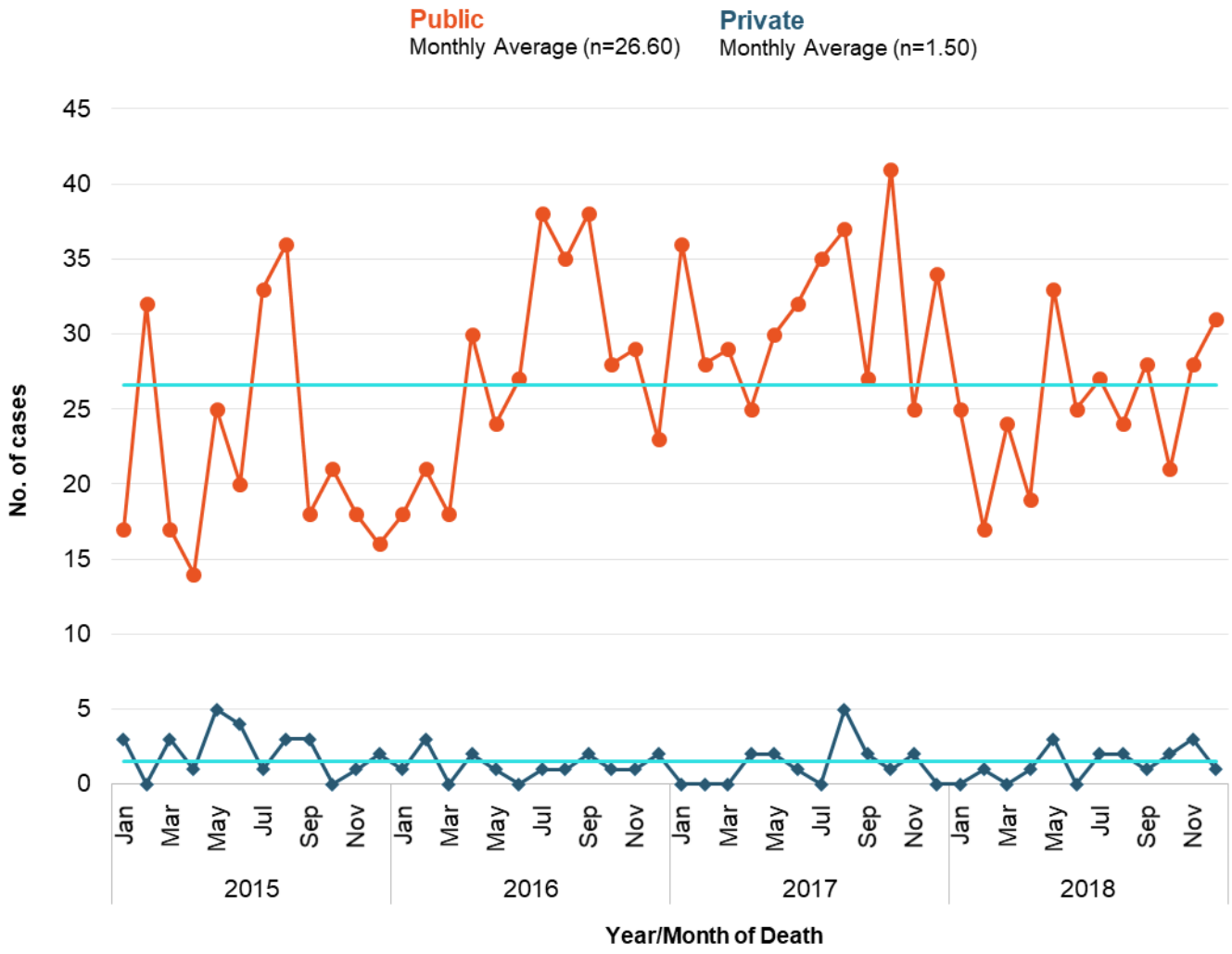


Figure 11: Analysis of deaths occurring in health facilities (n=1,349) notified monthly to SCIDUA for the calendar years 2015-18

The CEC encourages Local Health Districts and Specialty Health Networks of NSW Health to adopt a culture of over-reporting for notifiable deaths. This allows the SCIDUA Program to determine if any deaths outside the 24 hour period may be relevant for review by the Committee, or appropriate for referral to the Collaborating Hospitals' Audit of Surgical Mortality (CHASM) Program.

The figure below demonstrates that hospitals with dedicated resources to capture and report notifiable deaths to the SCIDUA Program, will appear upon analysis to have a higher number of notifiable deaths per annum. However, the elevated rates suggest that the numbers are due to the stringent methods of identification implemented at the hospital level, resulting in a more detailed capture of death review, enabling more cases to be assessed by the Triage Committee against the criteria of SCIDUA.

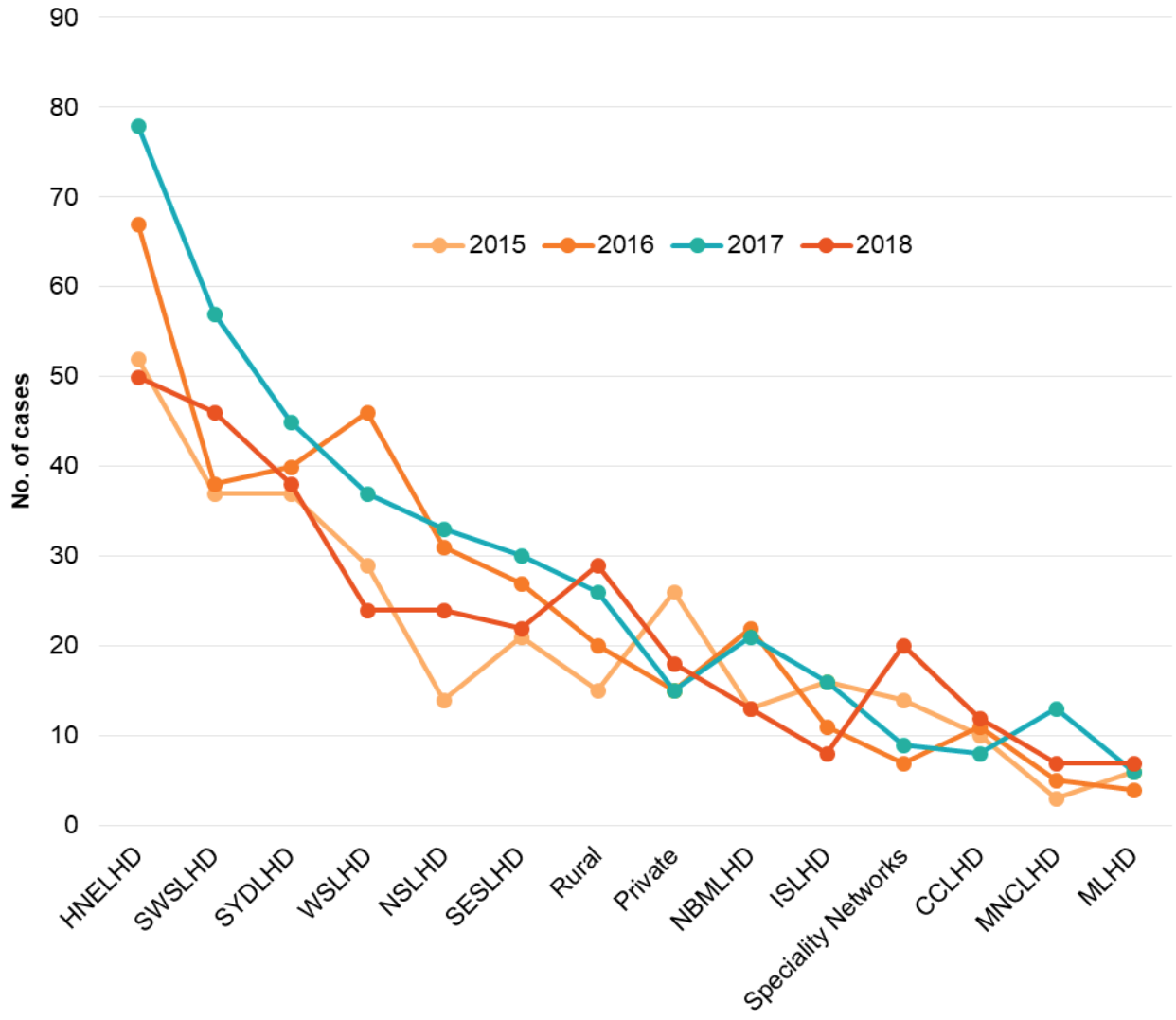


Figure 12: Distribution of deaths (n=1,349) by calendar year for health facilities over a four year period (2015-18) notified to SCIDUA for review

In order to obtain the most accurate information from the medical practitioner/s involved with the death of a patient that meets the notifiable death criteria of the *Public Health Act 2010*, it is necessary to capture the recollection of events as soon after the event as possible.

The members of the SCIDUA Committee encourage practitioners to adopt a model of early notification (1-30 days) to ensure a higher level of accuracy for notifiable deaths. If you have any queries or concerns about the process you may contact the SCIDUA Chairperson.

The figure below shows the length of time taken over a four year period (2015-2018) for practitioners to submit a Form of Notification (FON) to SCIDUA following a patient's death.

- On average 41% (n=550) of deaths are notified within 30 days of the event. However, there remains approximately 32% of deaths notified more than 90 days after a patient death
- It is encouraging to see that four forms were submitted on the same day of death

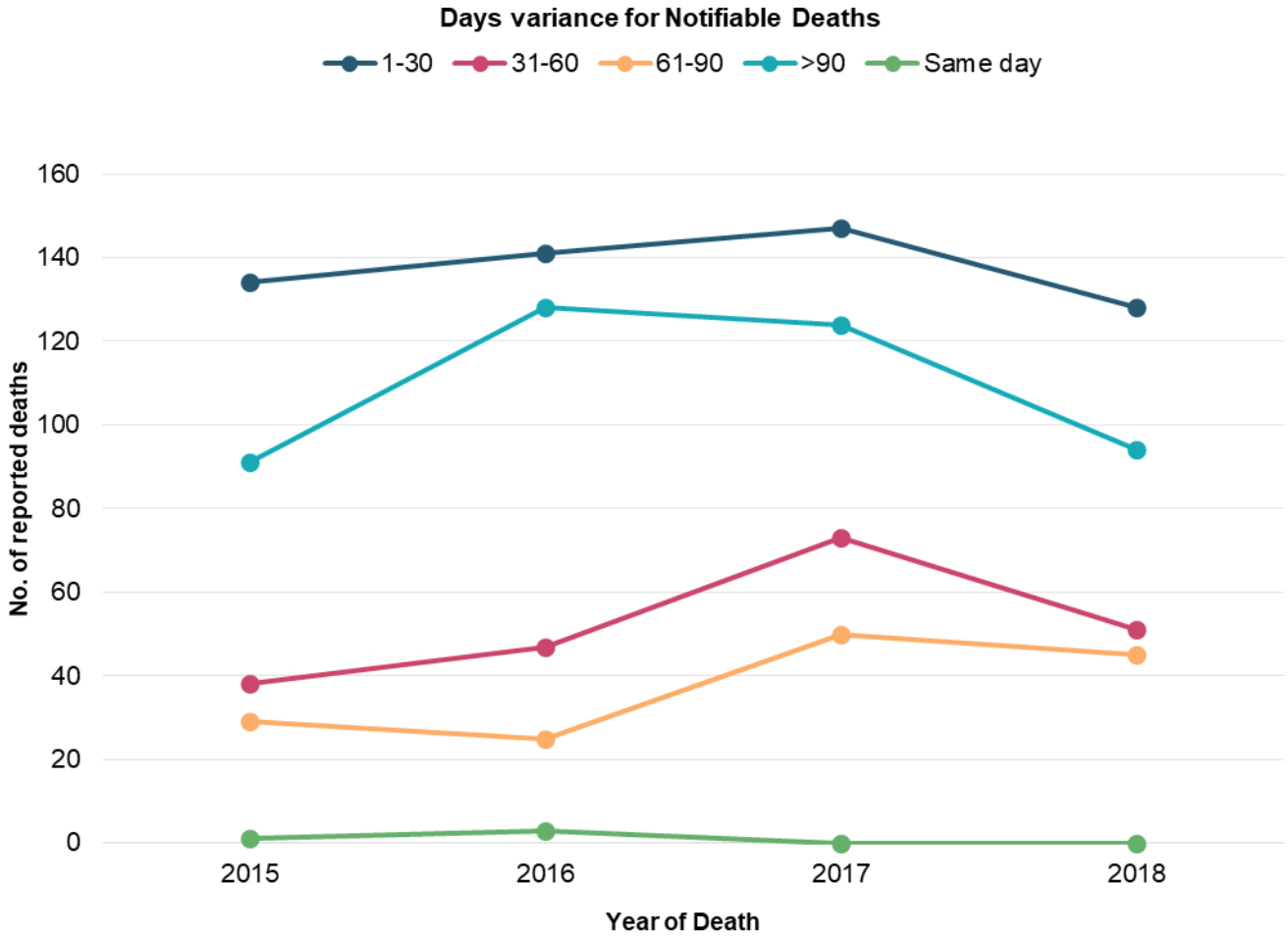


Figure 13: Time taken to submit a Form of Notification to SCIDUA following a patient death

Further analysis on the data collected for 2018 by removing the cases that were classified as excluded or incomplete. It examines the spread of variance between the death of the patient and the time taken to submit the Form of Notification to SCIDUA.

- The maximum time period was 434 days for submission to SCIDUA
- The majority of deaths (57%) are submitted to SCIDUA within 60 days (n=170)

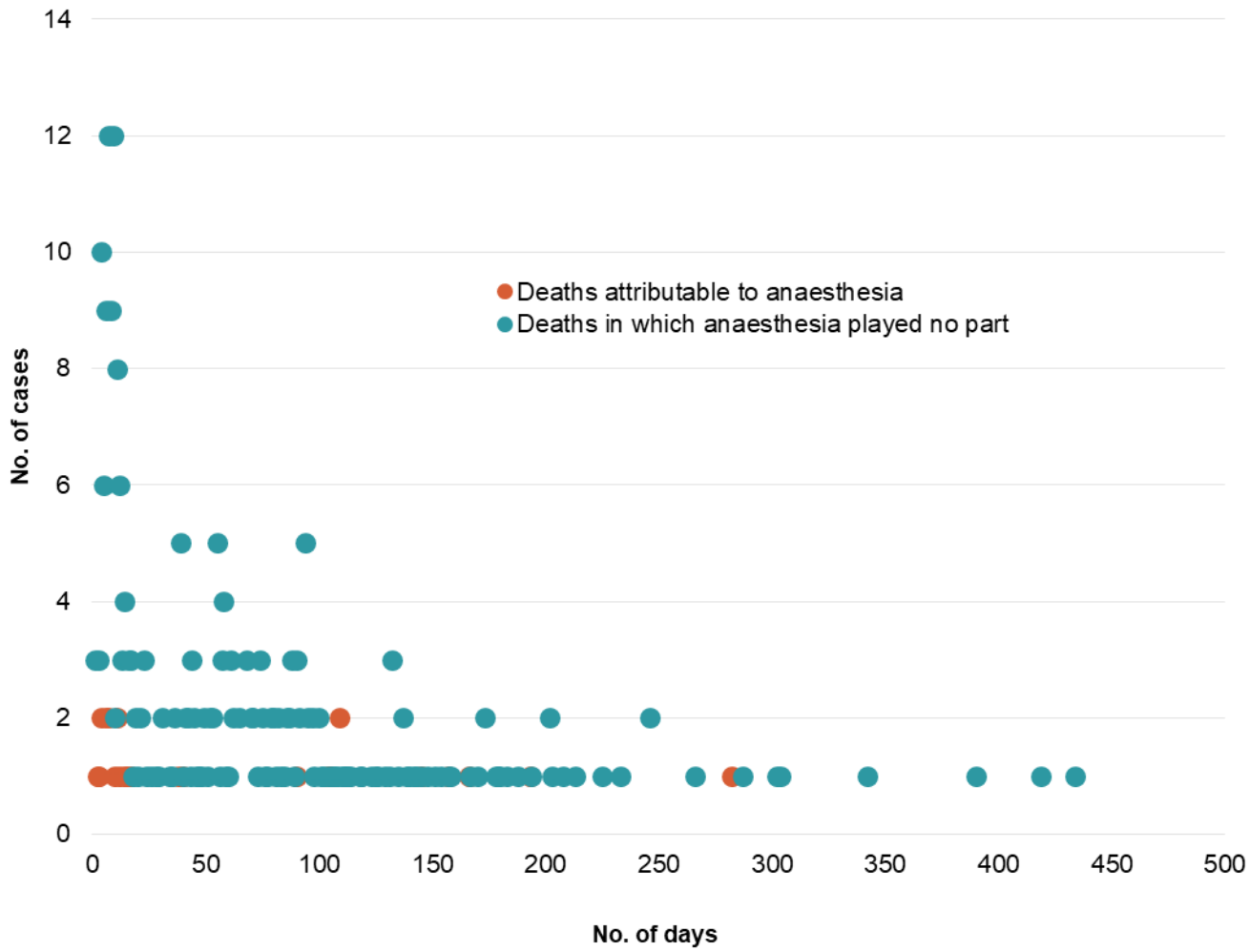


Figure 14: Days variance for submission of forms to SCIDUA for 2018, categorised by attributable and non-attributable anaesthesia-related deaths

3.1.1 Category 8 Deaths

Unassessable Deaths

Unfortunately some Forms of Notification (FON) of patient deaths do not have enough details around the event, or have inadequate information, for the Committee to make a determination. When such submissions are received the SCIDUA Program staff attempt to follow up with the medical practitioner involved in the case to request additional or clarifying information. This can prove challenging if the details of the practitioner are incorrect or have not been provided by the health facility in the first instance.

In 2018 the Committee issued 46 requests to medical practitioners for to provide additional information using the SCIDUA Questionnaire to assist with the Committee's assessment of the case. A response rate of 59% (n=27) was achieved.

The figure below shows the number of cases submitted to SCIDUA which become classified as 'unassessable deaths' mostly due to the lack of information provided.

- In 2018, four unassessable deaths occurred in the operating theatre

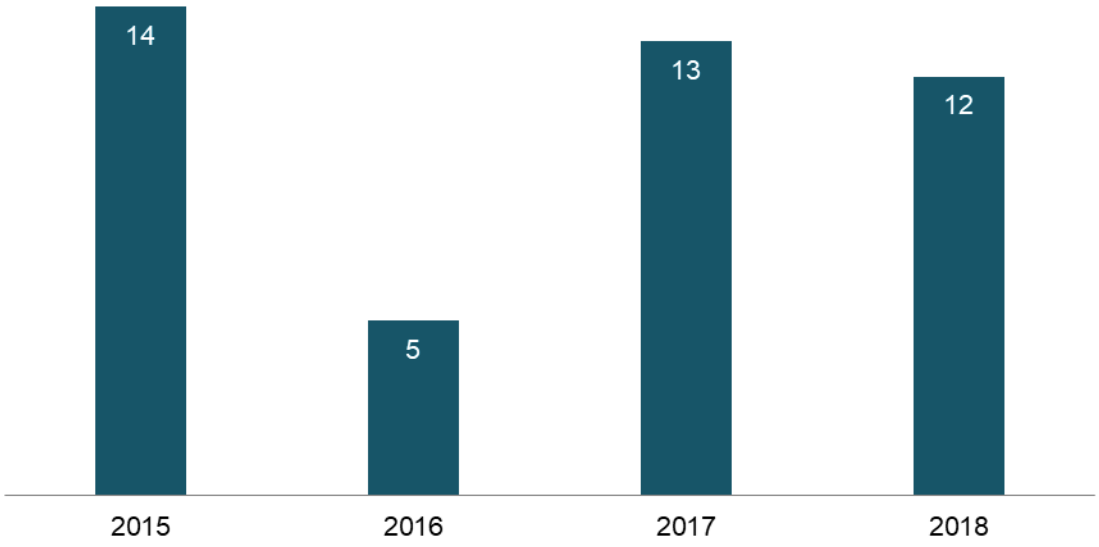


Figure 15: Unassessable SCIDUA cases (n=44) over a four year period (2015-18)

3.2 Trend Reporting

3.2.1 Trauma Deaths

According to the NSW Institute of Trauma and Injury Management (ITIM)[8], *major trauma* is defined as all patients of any age, who were admitted to a designated NSW Trauma Service within 14 days of sustaining an injury, and:

- Had an Injury Severity Score (ISS) > 12 (moderate to critically injured); or
- Admitted to an Intensive Care Unit (irrespective of ISS) following injury; or
- Died in hospital (irrespective of ISS) following injury, except those with an isolated fractured neck of femur injury sustained from a fall from a standing height (<1 metre) and those aged 65 years or older who die with minor soft tissue injury only.

The classification of a trauma death is allocated by members of the SCIDUA triage subcommittee prior to being reviewed by the Committee. Most of these deaths received an ASA score of 'E' (requiring emergency procedure) and were admitted to a Level 6 hospital.

The analysis of notifications to SCIDUA for *death due to trauma* indicates 17 (8%) of the 224 cases reviewed by the Committee in 2018 were classified as inevitable deaths. We were able to identify that the male representation (n=11) attributed to trauma deaths is higher than the female representation (n=6).

Further analysis on the age distribution of male trauma deaths was conducted over a four year period (2015-2018) and is displayed in the figure below.

- The lowest trauma deaths occurred in 2018 (n=11) with the highest in 2016 (n=22)
- Notified trauma deaths occurring for 2015 (n=18) and 2017 (n=20)

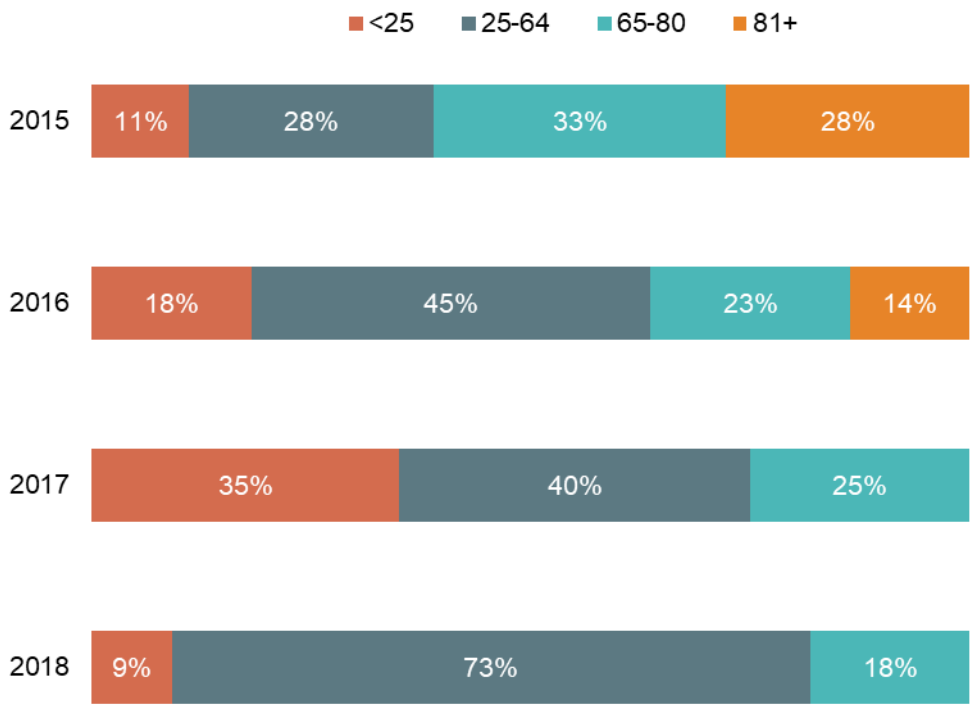


Figure 16: Analysis of male trauma deaths (n=71) assessed by SCIDUA over the four year period (2015-18) and classified as inevitable deaths

[8] https://www.aci.health.nsw.gov.au/__data/assets/pdf_file/0007/341098/Major_Trauma_in_NSW,_2015._A_Report_from_the_NSW_Trauma_Registry_Final.pdf

3.2.2 Non-Beneficial Surgery

Futility in surgery is only occasionally clearly defined. It usually presents as a borderline decision between ethics, clinical predictions and patient communication for which no solid evidence currently exists[9].

We examined data over a four year period (2015-2018) to identify the timing / urgency of surgery for cases which were classified by the Committee as 'futile' or non-beneficial (n=49), meaning, there was considered a minimal chance of a successful patient outcome.

The analysis shows that 69% (n=34) of patients present as emergency surgery with most cases determined to be inevitable deaths in which anaesthesia played no part.

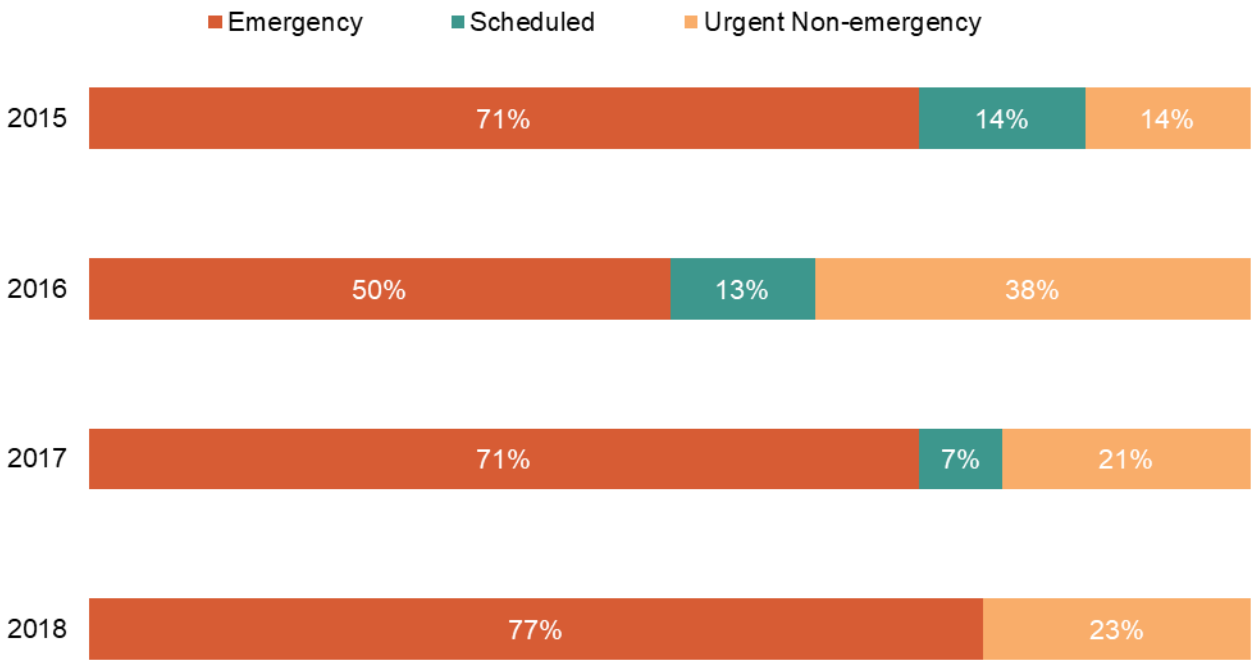


Figure 17: Distribution of cases across categories of 'urgency of surgery' for non-beneficial surgical cases over a four year period (2015-18)

[9] Søreide and Desserud Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine (2015) 23:10 https://sjtrem.biomedcentral.com/articles/10.1186/s13049-015-0099-x

3.2.3 Deaths Attributable to Anaesthesia

We examined data over a four year period (2015-2018) to identify the male / female distribution by age group for deaths classified as Category 1, 2 or 3 by the Committee, i.e. attributable to anaesthesia (n=188), and identified that 57% (n=108) were female, with the lowest number of deaths attributable to anaesthesia occurring in 2018 (n=37) and the highest in 2015 (n=60).

Wider analysis of data captured for the period 2009-2018 showed the total deaths classified by the Committee as 3,170 with only 17.7% deaths attributable to anaesthesia (n=561).

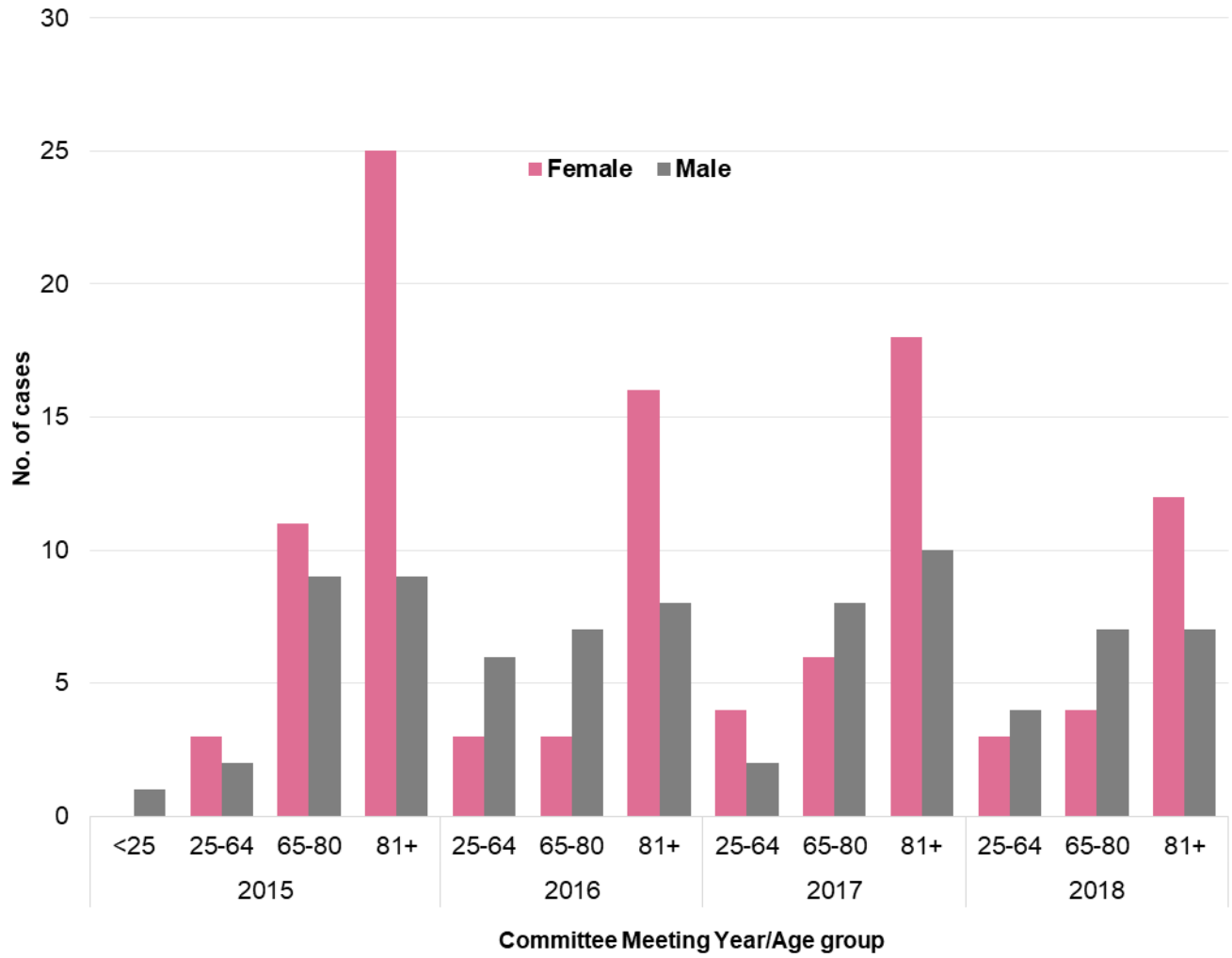
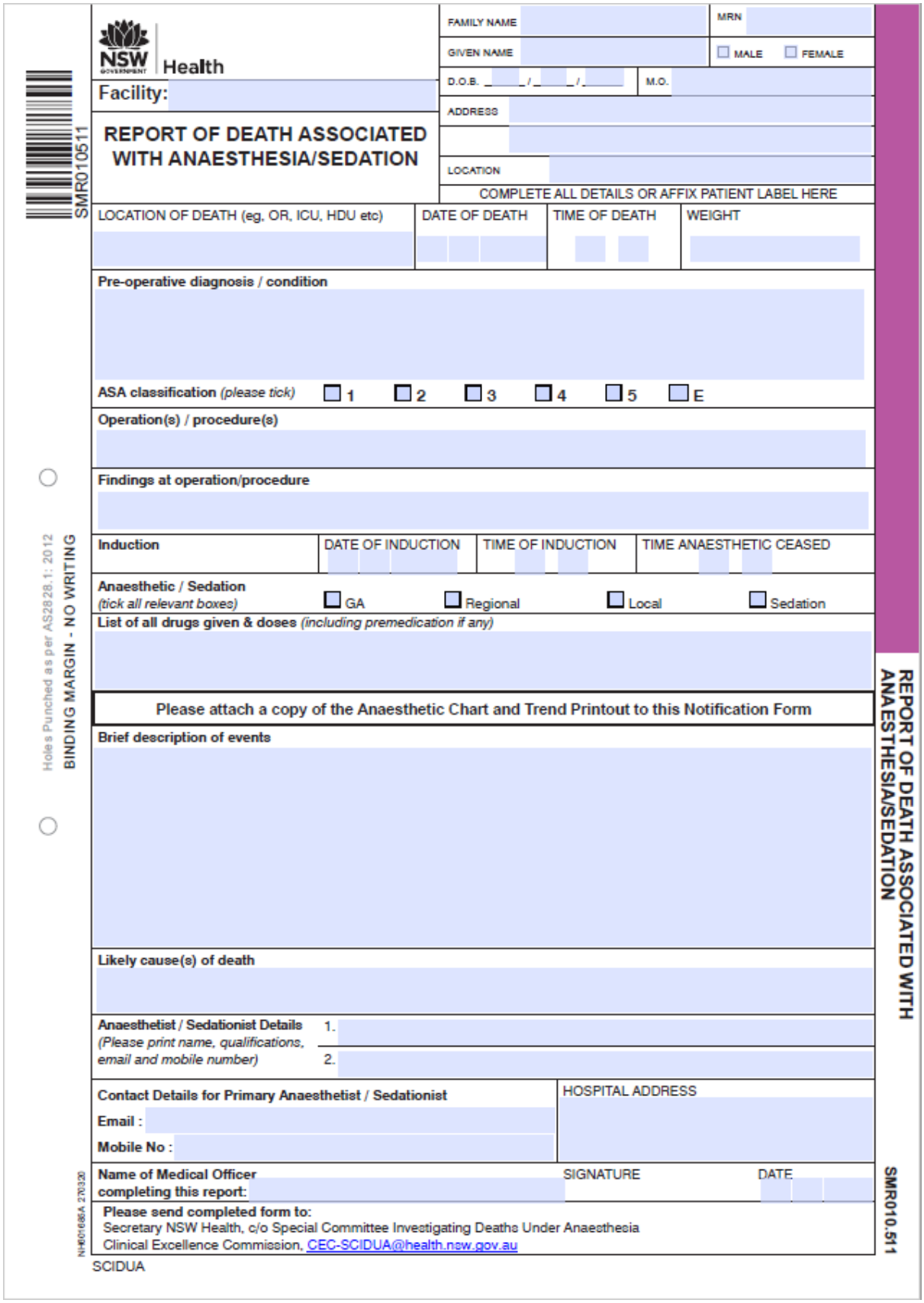


Figure 18: Male / Female distribution of deaths attributable to anaesthesia by age group over a four year period (2015-18)

4. Appendices

4.1 Appendix A – SCIDUA Form of Notification



NSW Health

Facility:

REPORT OF DEATH ASSOCIATED WITH ANAESTHESIA/SEDATION

SMR010511

FAMILY NAME | MRN

GIVEN NAME | ☐ MALE ☐ FEMALE

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)* ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 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)* ☐ GA ☐ Regional ☐ Local ☐ Sedation

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

Please attach a copy of the Anaesthetic Chart and Trend Printout to this Notification Form

Brief description of events

Likely cause(s) of death

Anaesthetist / Sedationist Details *(Please print name, qualifications, email and mobile number)* 1. 2.

Contact Details for Primary Anaesthetist / Sedationist

Email :

Mobile No :

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, CEC-SCIDUA@health.nsw.gov.au

SCIDUA

SMR010.511

REPORT OF DEATH ASSOCIATED WITH ANAESTHESIA/SEDATION

BINDING MARGIN - NO WRITING

Holes Punched as per AS2828.1: 2012

4.2 Appendix B – SCIDUA Questionnaire

SPECIAL COMMITTEE INVESTIGATING DEATHS UNDER ANAESTHESIA

PRIVATE & CONFIDENTIAL REPORT

This document is designed for the purposes of SCIDUA and the information collected is privileged under Section 23 of the NSW Heath Administration Act 1982

Case Record of Death in Association with Sedation and/or Anaesthesia

Reporting cases to regional or national anaesthesia mortality committees qualifies for two (2) credit points per hour with the ANZCA Continuing Professional Development program.

PLEASE RETURN THIS FORM TO:

THE SECRETARY – SCIDUA
Locked Bag 8
HAYMARKET NSW 1240

Case Number *(office use only)*	**Hospital & Location** *(eg. ICU; Theatre; Recovery; Ward)*		**Date & Time of Death**	
Name of Patient		**Age**	**Sex**	**Weight**
Name of Anaesthetist/Sedationist	**Qualifications**	**Appointment**	**Name & Status of other Anaesthetists present**	
Pre-operative diagnosis				
Condition(s) found at operation				
Operation proposed				
Operation(s) carried out				
Pre-anaesthetic assessment 1. Relevant history 2. Clinical findings 3. Relevant investigations				
	ASA ☐ I ☐ II ☐ III ☐ IV ☐ V ☐ E			
Pre-anaesthetic preparation including: 1. Blood or fluids given pre-operatively and over what period 2. Pre-medication if any 3. Any other measures				

PLEASE SEE OVER

DESCRIPTION OF ANAESTHETIC GIVEN

Times may be of considerable importance. Please use 24-hour clock. Please include in your description:

1. Anaesthesia	2. Intra-operative Course	3. Other Information
• Drugs given & doses • Airway and ventilation management • Breathing circuit • Monitoring techniques (SpO_2, ECG, Invasive or non-invasive BP monitoring)	• Blood/fluid given • Please include intra-operative & observations • Critical events and their management (eg. hypotension or hypoxia) • Post-operative management plan	• Adjunct techniques • Positioning • Post-operative course & events leading to death

TIME	DATE

Please attach copies of Anaesthetic and Recovery room records

Opinion as to cause of death and any other information which might assist the Committee	

4.3 Appendix C – SCIDUA Case Classification

SCIDUA Glossary of Terms – Case Classification

A Deaths Attributable to Anaesthesia

Category 1	Where it is reasonably certain that death was caused by the anaesthesia or other factors under the control of the anaesthetist.
Category 2	Where there is some doubt whether death was entirely attributable to the anaesthesia or other factors under the control of the anaesthetist.
Category 3	Where death was caused by both surgical and anaesthesia factors.

Explanatory Notes:

- *The intention of the classification is not to apportion blame in individual cases but to establish the contribution of the anaesthesia factors to the death.*
- *The above classification is applied regardless of the patient's condition before the procedure. However if it is considered that the medical condition makes a substantial contribution to the anaesthesia-related death subcategory H should also be applied.*
- *If no factor under the control of the anaesthetist is identified which could or should have been done better subcategory G should also be applied.*

B Deaths In Which Anaesthesia Played No Part

Category 4	Surgical death where the administration of the anaesthesia is not contributory and surgical or other factors are implicated.
Category 5	Inevitable death which would have occurred irrespective of anaesthesia or surgical procedure.
Category 6	Incidental death which could not reasonably be expected to have been foreseen by those looking after the patient, was not related to the indication for surgery and was not due to factors under the control of anaesthetist or surgeon.

C Unassessable Deaths

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

Page 1 of 5

CAUSAL OR CONTRIBUTORY FACTORS IN CATEGORY A DEATHS

Note that this 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

(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 reinstitute proper respiratory support after deliberate hypoventilation (e.g. bypass)
(iv) Circulatory support	Failure to provide adequate support where there is haemodynamic instability, in particular in relation to techniques involving sympathetic blockade.

C. Anaesthesia Drugs

(i) Selection	Administration of a wrong drug or one which is 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	E.g. prolonged coma.

D. Anaesthesia Management

(i) Crisis management	Inadequate management of unexpected occurrences during anaesthesia or in other situations which, if uncorrected, could lead to death.
(ii) Inadequate monitoring	Failure to observe minimum standards as enunciated in the ANZCA Professional Documents or to undertake additional monitoring when indicated e.g. use of a pulmonary artery catheter in left ventricular failure.
(iii) Equipment failure	Death as a result of failure to check equipment or due to failure of an item of anaesthesia equipment.
(iv) Inadequate resuscitation	Failure to provide adequate resuscitation in an emergency situation.
(v) Hypothermia	Failure to maintain adequate body temperature within recognised limits.

E. Post-operative

(i) Management	Death as a result of inappropriate intervention or omission of active intervention by the anaesthetist or a person under their direction (eg. Recovery or pain management nurse) in some matter related to the patient's anaesthesia, pain management or resuscitation.
(ii) Supervision	Death due to inadequate supervision or monitoring. The anaesthetist has ongoing responsibility but the surgical role must also be assessed.
(iii) Inadequate resuscitation	Death due to inadequate management of hypovolaemia or hypoxaemia or where there has been a failure to perform proper cardiopulmonary resuscitation.

F. Organisational

(i) Inadequate supervision, inexperience or assistance	These factors apply whether the anaesthetist is a trainee, a non-specialist or a specialist undertaking an unfamiliar procedure. The criterion of inadequacy of supervision of a trainee is based on the ANZCA Professional Document on supervision of trainees.
(ii) Poor organisation of the service	Inappropriate delegation, poor rostering and fatigue contributing to a fatality.
(iii) Failure of interdisciplinary planning	Poor communication in peri-operative management and failure to anticipate need for high dependency care.

G. No Correctable Factor Identified

Where the death was due to anaesthesia factors but no better technique could be suggested.

H. Medical Condition of the Patient

Where it is considered that the medical condition was a significant factor in the anaesthesia related death.

Suffixes

Suffix Code	Suffix Description
c	Where bone cement is implicated
f	Where surgery is performed in circumstances in which it is clear before commencement of surgery that the chance of a successful outcome is negligible or non-existent.
t	Critical event at transfer.
01	Patient died as a result of surgical bleeding

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.

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.

5. Tables

6. Figures


NSW
GOVERNMENT
CLINICAL
EXCELLENCE
COMMISSION