NSW SPECIAL COMMITTEE INVESTIGATING DEATHS UNDER ANAESTHESIA

SCIDUA

2019

ANNUAL REPORT AND CASE STUDIES

DISCLAIMER

All identifying information has been omitted to preserve anonymity.

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NSW GOVERNMENT

CLINICAL EXCELLENCE COMMISSION

Activities of the Special Committee Investigating Deaths Under Anaesthesia, 2019 Special Report

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Executive Summary

The Special Committee Investigating Deaths Under Anaesthesia (SCIDUA) has been reviewing 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 New South Wales. For the purposes of this report, no distinction is made between anaesthesia-related and sedation-related deaths.

In New South Wales, under section 84 of the *Public Health Act 2010* it is mandatory for public and private facilities to report a death arising after anaesthesia or sedation for an operation or procedure to SCIDUA.

In 2019, the resident population in New South Wales, as reported by the Australian Bureau of Statistics[1], was 8,130,049. Using the Admitted Patient Data Collection[2] to examine patient separations (episodes of discharge or death) for 2019 we find that there were 3,341,785 admissions to NSW hospitals, of which 1,951,987 were admissions to public hospitals and 1,389,798 to private hospitals. Of the total admissions, there were 1,265,580 anaesthesia-related episodes, 525,844 occurred at public hospitals and 739,736 at private hospitals. Of the anaesthesia-related episodes, there were 3,624 deaths in hospitals, with 2,861 deaths occurring in public hospitals and 403 deaths in private hospitals. Refer to **Appendix A** for further details.

The Committee reviewed 417 cases where death had occurred during, due to, or within 24 hours of, an anaesthetic or administration of sedative drugs for medical/surgical procedures. Of these, 363 deaths fell within the terms of reference of SCIDUA.

The Committee classified 53 cases of anaesthesia-related deaths in 2019, an increase of 16 deaths from 2018. However, due to an increase in the deaths notified to the SCIDUA in 2019, this equates to a 1.8% increase in anaesthesia-related deaths compared with 2018.

Details of the 53 cases wholly or partly related to anaesthetic factors are as follows:

- Anaesthesia either directly caused, or substantially contributed to, the patient's death in 10 cases (Category 1 and 2)
- A combination of anaesthesia and surgical factors contributed to the patient's death in the remaining 43 cases
- Most of the patients were elderly, with 62.26% (n=33) of patients aged 81 years or older, and a further 26.42% (n=14) of patients aged between 65 and 80 years of age.
- Most patients were classified as critically ill with 66.04% (n=35) being ASA 4.
- Only 7.5% (n=4) of deaths related to anaesthesia occurred in the operating theatre or procedural room.

The Committee also reviews anaesthetic deaths to look for management choices that it considers could be improved. These are called correctable factors. In 2019, the Committee identified 11 (20.75%) anaesthesia-related deaths where it determined correctable factors were involved. The majority of these factors (n=7) were associated with airway maintenance.

This report also includes data for five years (2015-2019) to highlight the changes in reporting and classification, which confirms airway maintenance (n=25) as the highest correctable factor identified. Inevitable trauma deaths identify a high representation of males (n=91), and from the 1,693 notifications of death submitted by hospitals and medical practitioners, 221 were identified as anaesthesia-related deaths.

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[1] **Source**: ABS Population data, in HoPeD1 folder, SAPHaRI, Centre for Evidence and Epidemiology, NSW Ministry of Health. Data downloaded 18-Jul-2021.

[2] **Source:** Admitted Patient Data Collection, in HoPeD1 folder, SAPHaRI, Centre for Evidence and Epidemiology, NSW Ministry of Health. Data downloaded 17-Jul-2021.

Members of the Committee

Dr Carl D'Souza
Chairman

Dr Michele O'Brien
Deputy Chair

Ms Carrie Marr

Dr Jonathon Gibson

Dr David McLeod

Dr Damien Boyd

Dr Elizabeth O'Hare

Dr Benjamin Olesnicky

Dr Frances Smith

Acknowledgement

A special note of thanks is expressed to Dr Michele O'Brien who recently retired from the Committee as Medical Secretary, after dedicating more than 14 years of service.

Thank you to Dr David Pickford for his ongoing support and advice to the Committee. Your counsel is greatly appreciated.

Chairman's Foreword

When Professor Ross Holland established *The Special Committee* in 1960, he did so with one purpose in mind, that was to decrease the number of deaths occurring under anaesthesia which were preventable.

He hoped that by providing feedback to the anaesthetic community this would be possible.

Fast forward 60 years, and much of what Professor Holland hoped for has been achieved today. New South Wales has one of the lowest rates of anaesthetic-related deaths anywhere in the world. A true testament to the training and education of anaesthetists.

The 2019 Report again details case studies from which anaesthetists can analyse and reflect upon. This report, like its predecessor, is not meant be used as an anaesthetic recipe book. Rather my expectations are that anaesthetists read through the cases and the reflection points, then think about their own practice, speak to their colleagues, do their own research, and then decide what works safely in their hands.

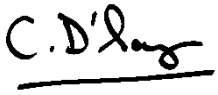
I have included a very special subgroup of patients in this year's report - that of maternity patients. I have done this intentionally to remind us all that being pregnant, birthing a child and all-going-well, should not be taken for granted.

Similarly to last year, I am incredibly grateful to the anaesthetists who have so generously allowed me to use their cases so that others may learn, and future events are avoided.

I would encourage everyone to report their cases, as the more cases that get reported, the more it enables me to share valuable information that will help keep other patients safe and perhaps help one of your colleagues avoid experiencing the same tragic event as you did.

I hope you enjoy reading the report and take away something from it.

Regards,



Dr Carl D'Souza
SCIDUA Chairman

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 death occur as soon as possible after the event. While the event is still fresh in the practitioner's mind, small details are retained, which can aid in the analysis of an unfortunate patient 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).'*

Some medical practitioners may be under the false impression that deaths which occur greater than 24 hours after administration of an anaesthesia are not reportable. This is not the case. If an intra-operative event occurs that later results in a patient's death that death is reportable, even if it occurs days or weeks later.

Health practitioners are required to notify the death by emailing a completed State Form (SMR010.511 – **Appendix B**): *Report of death associated with anaesthesia/sedation* 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.

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 C**).

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, revised in 2020 - see **Appendix D**.

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	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 both surgical and anaesthetic factors were thought to have attributed to the death
Note: 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.	

Group B has three categories of death where anaesthesia is thought to have 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 (with or without surgery), 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

Group C identifies deaths where the factors involved in the patient's death are not fully assessable. There are two categories:

Category 7	Those that cannot be assessed, despite considerable data, but where the information is conflicting or key data is missing. The Committee uses this category when it is unable to find out the actual cause of death
Category 8	For cases which cannot be assessed as the available data is inadequate to make a final determination

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 2019 reporting period a total of 363 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=363) notified to SCIDUA in 2019.

Death Type	Category	No. of cases
Deaths attributable to anaesthesia	1	9
	2	1
	3	43
Sub Total		**53**
Deaths in which anaesthesia played no part	4	21
	5	274
	6	7
Sub Total		**302**
Un-assessable deaths	7	3
	8	5
Sub Total		**8**
Grand Total		**363**

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 (58%, n=31), with most cases continuing to be orthopaedic, as in previous years.

Scheduled surgery accounted for 13 (25%) of the cases performed in anaesthesia-related deaths, while nine (17%) of the operations were performed as an emergency.

Orthopaedic surgery was performed in more than half of all anaesthesia-related deaths (57%, n=30). This is followed by abdominal (n=8), non-invasive procedural (n=6), cardiothoracic (n=4), urology (n=2), vascular (n=2), and general – non-abdominal (n=1).

1.7 Communication and 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 for Health
- 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" now reports 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 2019 and, together with the triage sub-committee who met six times in 2019, reviewed 417 cases. As in previous 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.

For deaths reviewed in 2019, 235 occurred in that year; 122 occurred in 2018; and 4 in 2017; and 2 from 2016. Most cases classified by the Committee were deaths occurring in the same reporting year, or in the preceding year. Table 2 below shows the 2019 SCIDUA summary of activity for cases reviewed.

Table 2: Summary of cases reviewed (n=417) and classified (n=363) by SCIDUA in 2019.

Activity	No. of cases
Reviewed by triage	355
Reviewed by the committee	62
Total cases reviewed	**417**
Classified by triage	302
Classified by the committee	61
Total cases classified	**363**

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.

We remind all medical practitioners that once an anaesthetic or sedation drug is given (regardless of the amount given) that patient is deemed to have had a procedure under anaesthesia / sedation and should a death occur, that death is reportable.

2.1 Anaesthesia-Related Deaths – Group A Deaths

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 nine Category 1 cases and one Category 2 case assessed by the Committee in 2019.

The following cases provide details on the background history, anaesthetic details and learnings of the Category 1 and 2 deaths following review by SCIDUA in 2019. One of the Category 1 cases, however, is not included as it is pending further analysis.

2.1.1 Category 1

Case 1 – General Surgery

An 86-year-old female for emergency laparotomy.

Background History:

A laparotomy for perforated viscus was done two weeks earlier. She had post-operative respiratory decline with consolidation and effusions on chest x-ray. The patient needed to return to theatre due to wound dehiscence with bowel on display.

Preoperative assessment revealed a well looking lady suffering no pain or nausea. Had eaten breakfast 3 hours prior comfortably. A plan was made for a rapid sequence induction with a video laryngoscope.

Intravenous access was very difficult. An 18g cannula was inserted under ultrasound guidance in cubital fossa. An arterial line was inserted prior to induction.

Anaesthetic Details:

1mg midazolam and 50mg propofol was given - volatile commenced.

The patient was asleep but still responding to jaw thrust - rocuronium given. She was noted to be still breathing and coughing.

The suspicion that the IV cannula had tissued was raised and a second IVC was sought.

This took roughly 2 minutes, after which further propofol and rocuronium was administered. The patient was intubated but the trachea noted to be heavily soiled.

The patient was now difficult to ventilate, and oxygen saturations were below 90. The endotracheal tube was suctioned, and bronchoscopy/lavage performed with limited success.

During preparation of central venous access, the patient deteriorated further becoming haemodynamically unstable requiring Adrenaline boluses.

At this point a discussion with the team ensued and a decision made to palliate the patient. She died 90 minutes later.

Learning Points

- Risk of aspiration increases 10-fold when patients are not fasted. Proceeding with an anaesthetic with unfasted patients sometimes is unavoidable, but, if at all possible, ensuring the patient is fasted should be a priority.
- Ensure intravenous access is patent prior to induction.
- Consider central access prior to induction in these patients when intravenous access is difficult or likely to fail.
- Intramuscular suxamethonium is an option if IV access fails during induction.

Aspiration *refers to the regurgitation of gastric contents and subsequent inhalation into the lungs, resulting in physical blockage of airways and inflammation leading to hypoxia and potentially death. It primarily occurs in unfasted patients or those who have delayed gastric emptying, who are unable to protect their own airway due to general anaesthesia.*

Anaesthetists usually manage this risk by using strict fasting protocols in elective or semi-urgent surgery (that is, "low risk" of aspiration) or by using alternative techniques, such as regional anaesthesia or rapid sequence induction (RSI), where fasting is not feasible or gastric emptying may be delayed (that is, "high risk"). ANZCA Safety of Anaesthesia Report 2015-2017, p19. March 2021.

https://www.anzca.edu.au/getattachment/4cc8c989-3874-4527-8af4-1f839bb3ba24/Safety-of-Anaesthesia-Report-2015-2017

Case 2 – Orthopaedic Surgery

An 89-year-old female - Short Gamma Nail of the hip.

Background History:

She had multiple co-morbidities: Congestive cardiac failure, ischaemic heart disease, pulmonary hypertension, chronic renal failure, Type 2 diabetes and dementia.

Anaesthetic Details:

An 18 g IVC and arterial line was inserted and 250 mls of Plasmalyte was given prior to induction. Induction consisted of sevoflurane 1%, fentanyl 25 µg and vecuronium.

The patient was intubated. Approximately 5 minutes post induction a steady drop in blood pressure was noted – she was unresponsive to fluids or metaraminol, leading to loss of cardiac output.

CPR was commenced and Adrenaline boluses were given (2 mg total). Three minutes later ROSCO.

A discussion was held with surgeons and intensive care physicians, and a decision made to palliate.

A fascia iliaca block was performed for pain control and the patient was extubated. She died 5 hours later.

Learning Points

- In elderly frail patients even the smallest amount of anaesthesia can cause compromise.
- Pulmonary hypertension is a major cause of morbidity and mortality and needs to be appreciated.
- Positive pressure ventilation does cause a major haemodynamic shift and compromise in the underfilled patient.
- Consider a transthoracic echocardiogram preoperatively - this will help guide fluid loading and determine the severity of pulmonary hypertension.
- Having invasive monitoring present during the induction phase and prior to the establishment of positive pressure ventilation in these patients will help detect compromise early.
- Sick patients may benefit from the institution of vasopressors with induction agents.
- If one vasopressor fails (e.g. metaraminol), try another (e.g. ephedrine).
- It is well worth having end of life discussions with family preoperatively to guide management in these situations.

Case 3 – General Surgery

An 81-year-old male admitted for colonoscopy investigating PR bleeding.

Background History:

Ischemic Heart Disease. Interstitial lung disease, Moderate Pulmonary Hypertension, Type 2 Diabetes Mellitus.

Anaesthetic Details:

The patient was given Propofol TCI (target-controlled infusion) for the procedure - 2-3 µg/ml. During the procedure the patient started to desaturate, and bile stained secretions were noted in his mouth. He then proceeded to cough vigorously. Saturations dropped to 80%.

The procedure was terminated and the anaesthetic ceased.

In recovery a chest X-ray revealed left lower lobe opacity and the patient was showing signs of labored breathing.

A trial of non-invasive ventilation failed to improve oxygenation, so he was intubated.

In intensive care ARDS was noted.

He failed extubation a few days later and was reintubated, but despite maximal support and prone ventilation, he died 10 days after his procedure.

Learning Points

- Aspiration is a risk with procedural sedation.
- Aspiration can occur in fasted patients and patients need to be assessed based on their individual risk.
- Being aware that this can occur during the procedure and having a plan to manage it when it does happen is important.
- Waking the patient up or intubating them at the time of the event are both suitable options depending on the degree of suspected aspiration and patient condition at the time.
- When using TCI, the actual dosage given to achieve plasma and then maintain effect site concentrations, can accumulate to be quite large over time. It is important to be aware of this.

Case 4 – General Surgery

A 76-year-old male for gastroscopy +/- stent insertion.

Background History:

The patient was diagnosed with adenocarcinoma of the oesophagus 4 months prior. There was metastases to liver and lungs, and he was treated with chemotherapy.

He was admitted three weeks prior to the hospital with lethargy and inability to tolerate oral intake. Recent worsening cough and shortness of breath.

An abdominal X-ray and abdominal CT scan showed dilated loops of bowel consistent with an ileus. Surgical review was sought but an open procedure was deemed inappropriate.

Pre-operative bloods revealed acute renal failure and pancytopenia.

Anaesthetic Details:

For the procedure, the patient was sedated slowly with propofol (100mg) and a Hudson mask was used. Almost immediately the patient vomited. He was suctioned.

The procedure was not attempted but an NG tube was passed by the endoscopist. One litre of fluid was drained. The patient was taken to recovery and a decision made not to escalate care. He died 3 hours later.

Learning Points

- A full stomach was not appreciated in this case.
- Full stomach should equal rapid tracheal intubation.
- There are many valid methods to do this, but all include good preoxygenation a rapidly acting paralytic agent and avoidance of bag mask ventilation.
- Paralysis prevents active regurgitation while avoiding bag mask ventilation and a head-up position avoids passive regurgitation.

Case 5 – General Surgery

A 64-year-old male for elective rectal surgery.

Background History:

The patient had rectal adenocarcinoma and a 50-pack year history of smoking.

Anaesthetic Details:

The patient was preoxygenated and given Midazolam 2 mg, Oxycodone 3 mg, Propofol 100 mg and Vecuronium 10 mg. Bag mask ventilation was easy, and the patient was intubated. Grade 1 view.

Post intubation ventilation was difficult and there was no capnography trace. The endotracheal tube was removed and then reinserted. Once again grade 1 view. This time some CO2 with a bronchospastic trace.

Non-invasive blood pressure was cycling without a reading accompanied by tachycardia and no pulse oximetry trace.

Anaphylaxis was suspected - Adrenaline 100 µg IV given. No pulse able to be felt. CPR commenced. Initial rhythm was PEA then Asystole then VF. During resuscitation the following drugs were administered:

- 9 mg Adrenaline
- 40 units Vasopressin
- 200 mg Sugammadex
- 300 mg Amiodarone
- 8 L of crystalloid

He also received 2 units of blood.

The patient was shocked 6 times during the resuscitation. The cardiothoracic team were called in to institute ECMO which was achieved within 56 minutes of arrest. The patient was transferred to ICU but showed very poor neurological recovery. Post-arrest tryptase level was 142 µg/ml.

Treatment was withdrawn 4 days later after neurological assessment revealed profound irreversible hypoxic brain injury.

Learning Points

- Anaphylaxis can occur with any drug.
- Even with immediate recognition and treatment outcomes can still be very poor.
- Tryptases should be taken after every suspected reaction.
- Be aware of the signs (tachycardia, unexplained hypotension, bronchospasm, rash) and consider ECMO early if in an institution which can provide it.
- The use of sugammadex in the treatment of suspected anaphylaxis not supported by evidence. Adrenaline and fluid resuscitation remain the mainstay of treatment.

Case 6 – General Surgery

A 91-year-old female for laparotomy and release of femoral hernia

Background History:

The patient was admitted with small bowel obstruction secondary to a femoral hernia on a background of atrial fibrillation and congestive cardiac failure.

Her INR was 3.4 at admission and this was reversed with Prothrombinex 1500 units and Vitamin K 1mg was given.

Anaesthetic Details:

A radial arterial line and 16 g IVC was inserted and a rapid sequence induction was executed with propofol 30 mg and suxamethonium 100 mg.

Post induction the patient suffered a massive aspiration event. She was intubated.

Bronchoscopy and lavage were performed, and surgery expedited.

During the case there was increasing inotropic requirements and the patient required 100% oxygen to maintain saturations.

She was transferred to ICU post op where it was apparent that the patient was not going to survive. After discussion with the family treatment was withdrawn and the patient died 4 hours after surgery.

Learning Point

- Even when everything is planned and executed perfectly, adverse outcomes can still occur

Case 7 – General Surgery

An 80-year-old male for relook laparotomy.

Background History:

Gall bladder Cancer - diagnosed 2 weeks prior on laparoscopy. Sinus bradycardia during the case was noted. He was reviewed by cardiologists. No intervention was required.

Extended right hemicolectomy and portal vein reconstruction 5 days prior. Transvenous pacing wires inserted intra-operatively and removed 24 hours post-surgery.

Now the patient had wound dehiscence requiring surgery.

Anaesthetic Details:

A radial arterial line and 18 g IVC was inserted

The patient was fasted so standard induction was given. Propofol 60mg and Rocuronium 50mg.

The patient regurgitated a large amount of vomitus. He was suctioned, put on his left side and intubated in the lateral position using a video-laryngoscope.

The endotracheal tube was suctioned, and ventilation commenced. There was transient desaturation to 84% but then improved.

Surgery was commenced. During the case oxygen saturations were steadily falling, rising airway pressures, worsening gas exchange and respiratory acidosis were noted.

By the end of the case arterial blood gases on 100% Oxygen - pH 7.23 PaO_2 75 $PaCO_2$ 63 BE -1.5 Lac 2.5.

Noradrenaline was started and then Vasopressin added. The patient was transferred to ICU.

After discussion with the family the patient was palliated. He died 3 hours later.

Learning Points

- Fasting not a true indicator of an empty stomach.
- Surgery for intrabdominal pathology should always arouse suspicion of incomplete stomach emptying and heightened aspiration risk.
- It was appropriate to commence the case as patient had stabilized and it was considered emergency surgery.

Case 8 – General Surgery

A male in his early twenties presented for emergency laparoscopic appendectomy.

Background History:

Occasional smoker and childhood asthma.

The patient presented to hospital with a 2-day history of feeling unwell / nausea and right iliac fossa (RIF) pain.

Anaesthetic Details:

The patient was induced with a modified rapid sequence. Midazolam 2.5mg, Fentanyl 100 µg, Propofol 200 mg and Rocuronium 70 mg. The operation proceeded uneventfully and was completed in 30 minutes. Intraoperatively the patient received Cephazolin, parecoxib and ondansetron and a further dose of fentanyl.

The patient was transferred onto a bed and sat upright in preparation for extubation. He was suctioned and breathing spontaneously and opening eyes to command. Sugammadex 400 mg was given and the patient extubated.

Almost immediately post extubation the patient was noted to have an audible wheeze and started to desaturate. Bag mask ventilation was attempted, but despite high peep applied through the circuit ventilation was not possible. Oxygen saturations were 20% and the patient lost consciousness. An arrest was called and the patient reintubated easily.

Salbutamol was delivered through the endotracheal tube and Adrenaline 0.5 mg intramuscularly and then 100 µg intravenously.

CPR commenced with the rhythm being PEA. The endotracheal placement was confirmed with a C-MAC as ALS (Advanced Life Support) continued.

Pink frothy sputum was noted in the endotracheal tube and suctioned. 19 minutes later there was return of spontaneous cardiac output.

Cisatracurium 50 mg and Hydrocortisone 200 mg were given. A chest x-ray revealed diffuse air space changes consistent with

pulmonary oedema.

The patient was transferred to ICU but unfortunately did not show any signs of neurological recovery. A nuclear medicine scan confirmed no cerebral perfusion. The patient died 7 days later.

Serial Mast Cell Tryptases were 3.6 µg.L, 2.3 µg/L and 2.3 microg/L (Done at time 0, 4 hours and 24 hours respectively)

Learning Points

- The exact cause of this patient's death remains unknown.
- Clinically it sounds very much like anaphylaxis.
- The other possibilities such as aspiration and negative pressure pulmonary oedema could be considered, but usually are not accompanied by such abrupt cardiovascular collapse.

2.1.2 Category 2

Case 9 – General Surgery

A 56-year-old male for emergency endoscopy for upper gastrointestinal bleeding.

Background History:

Liver failure (Child Pugh C) with oesophageal varices. Admitted to hospital 9 days prior with bleeding varices progressing to multi-organ compromise - respiratory and renal. Varices banded and ascites drained during hospital stay.

MET call on ward for hypotension and a decision was made to go to theatre.

Anaesthetic Details:

The patient arrived in the anaesthetic bay in extremis, shocked and confused. Hb 71, platelets 53 and INR 5.0.

He was oxygenated via High Flow Nasal Prongs and IV access and arterial access obtained.

Rapid sequence induction commenced.

Ketamine 40 mg, Propofol 50 mg and Rocuronium 50mg with cricoid pressure.

Immediate regurgitation of large volume coffee ground vomitus (approximately 2L). Suctioned and intubated.

Procedure commenced - difficult to control bleeding. Abdominal distention noted during the procedure. Oxygen requirements increasing during procedure.

Patient given packed cells, platelets, cryoprecipitate and an octreotide infusion.

Patient transferred to ICU where a discussion with the family took pace and a decision made to palliate the patient.

Learning Points

- Given the patient's deterioration while in hospital, end of life discussions should have been undertaken, and a plan in place when this predictable event occurred.
- Note: If using Rocuronium for a rapid sequence the recommended dose is 1.2mg/kg.

Category 3 Deaths

There are two sub-sets of anaesthesia-related death, those with (i) a correctable factor and those with (ii) no correctable factor. Correctable factor cases 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.

Anaesthesia Related with Correctable Factor

The Committee determined that 20.75% (n=11) of anaesthesia-related deaths (n=53) had correctable (causal or contributary) factors. This is a decrease of 15% from 2018 (n=13). Some cases had multiple factors identified and these are specified below:

Anaesthesia drugs - adverse event (n=1)	Anaesthesia drugs - dosage (n=2)
Post-operative management (n=1)	Post-operative supervision (n=1)
Pre-operative assessment (n=1)	Technique - airway maintenance (n=7)
Technique - choice or application (n=1)	Technique - ventilation (n=1)

Note: The frequency counts add up to more than 11, because some deaths have more than one factor identified.

Death caused by both surgical and anaesthetic factors

Most surgical procedures require the delivery of anaesthesia in order to make them possible. Anaesthesia itself will decrease the ability of a patient to mount a response to a critical life-threatening event. This combined with the surgical insult, ultimately leads to a patient's death. But it is hard to separate the two in certain cases, and the cause of death in these cases is attributed to both *surgical and anaesthetic factors*.

2.1.3 Category 3

Case 10 – Vascular Surgery

A 45-year-old female for superficialisation of left arm AV fistula.

Background History:

- End stage renal failure secondary to diabetes
- Super-morbid obesity. BMI 70 (seventy)
- Obesity hypoventilation syndrome.
- Pulmonary embolism on Warfarin.
- Recent lower respiratory tract infection.

Anaesthetic Details:

Local anaesthetic with sedation was used for the case.

The patient was commenced on high flow nasal prongs and sedated with dexmedetomidine. Loading dose (68 µg) and then an infusion (34 µg/hr). Cephazolin 2 g was given. The patient was prepped and surgery commenced.

About 30 minutes into the procedure the patient complained of feeling short of breath and hot, saturations began to fall and then the patient lost consciousness, which progressed to a cardiorespiratory arrest. 200 mg of suxamethonium was given, the patient was intubated, and CPR started. For 30 minutes resuscitation continued with PEA.

During resuscitation:

- Lung ultrasound showed no evidence of pneumothorax.
- TOE showed no obvious PE.
- No rash noted.
- Adrenaline 7 mg and intralipid given.
- For the entire surgical procedure 21 mls of 1% xylocaine with Adrenaline had been given.

Post mortem showed mild atherosclerosis of coronary vessels and a heart blood tryptase of 478 µg/L indicative of anaphylaxis.

Learning Points

- It is very challenging to sedate someone with obstructive sleep apnea. There is a very fine line between patient comfort and obstruction in this population.
- Always suspect anaphylaxis in a patient with a sudden cardio-respiratory deterioration.
- Anaphylaxis caused the patient's death in this case but to what substance remains unclear.
- Resuscitation in obese patients is always difficult. Despite superb resuscitation efforts in this case the patient still died.

Case 11 – Orthopaedic Surgery

A 77-year-old female admitted with a fall while trying to mobilize with walking frame for long gamma nail insertion.

Background History:

- Morbid obesity (BMI 40).
- Severe pulmonary hypertension (PASP 64mmHg) with Cor Pulmonale.
- Obstructive sleep apnoea.
- Chronic airways disease (50 pack year smoker)- previous home oxygen.

Anaesthetic Given:

The plan was for spinal anaesthetic with sedation. 20 g IVC and arterial line inserted.

Spinal details - 1.8 mls heavy bupivacaine given with good pain relief.

The patient was positioned, and the operation commenced. The patient felt pain on incision so a conversion to general anaesthesia was undertaken. Propofol 100 mg, Fentanyl 50 µg was administered and then an I-gel 3 laryngeal mask inserted.

The orthopaedic registrar was the primary proceduralist and the case was long and difficult.

During the case there was progressive blood loss and haemodynamic instability. A central line was inserted, and noradrenaline commenced.

By the end of the case she had lost 1.5 L blood and was on Noradrenaline at 20 mls/hr.

She had received 2 litres crystalloid and 2 units of packed cells intraoperatively.

The anaesthetic was ceased and she was allowed to emerge on high flow nasal prong oxygen. She was transferred to ICU

In ICU she progressively deteriorated - becoming acidotic and developing worsening liver and renal function. A family meeting was held, and a decision made to withdraw active treatment. She died 6 hours post procedure.

Learning Points

- Severe pulmonary hypotension is a major co-morbidity and independently increases operative mortality.
- Be wary when inducing general anaesthesia if a patient already has a spinal anaesthetic on board. The hemodynamic effects of the induction agents may be exaggerated.
- Intubation is recommended when major blood loss ensues, and inotropes are required.
- Senior operating personnel should be dealing with cases when it becomes complicated or major blood loss occurs.
- The dose of spinal anaesthesia for hip surgery varies in literature from 5mg to 12.5mg of Bupivacaine.
- Just be aware, the lower the dose used, the higher the likelihood that the block won't cover the entire surgical site, or last for the duration of the operation.

Case 12 – General Surgery

An 80-year-old male admitted for elective colonoscopy.

Background History:

- Myasthenia Gravis on pyridostigmine 180 mg three times a day.
- Admitted the evening prior to procedure for bowel preparation.
- Pyridostigmine withheld on morning of surgery under instruction of the ward medical officer.
- Had had previous colonoscopies where pyridostigmine was withheld on the morning of the procedure and given post op without any issues.

Anaesthetic Details:

Procedure commenced in the early afternoon under general anaesthesia with an I-gel 3 mask. Completed uneventfully and recovered uneventfully.

Pyridostigmine was charted by the anaesthetist on the medication chart.

The proceduralist reviewed the patient and was instructed that he could go home if he was well.

Three hours post procedure the patient was complaining of difficulty swallowing food. His heart rate had gradually risen to 110 and oxygen saturations had gradually dropped to 96% on room air.

This information was not conveyed to the treating team members and the patient was discharged home. No pyridostigmine was given post op.

Three hours post discharge the patient was admitted to hospital with hypoxia and respiratory failure. The patient died 15 hours post procedure en-route to a major hospital.

Learning Points

- Pyridostigmine is critically important in Myasthenia Gravis patients. It should only be withheld under the instruction of the treating anesthetist.
- Thought should be given about giving parenteral neostigmine in lieu of oral doses.
- The signs of neurological deterioration (difficulty swallowing) were not appreciated. It should have sounded alarm bells.
- Overnight stay in these patients should be considered in order to ensure they are tolerating their medications post procedure and observing them for neurologic deterioration.
- Staff communication was less than ideal in this case.
- Patient selection is very important for suitability for day surgery procedures.
- Patients with serious co-morbidities should be considered for overnight admission following their procedure.

Case 13 – General Surgery

A 78-year-old male admitted for laparoscopic hernia repair.

Background History:

End Stage Chronic Airways Disease on home oxygen - room air oxygen saturations of 88% - Parkinson's disease, Dementia.

Transthoracic echo showed normal left ventricular function and no valvular abnormalities.

Preoperative discussion with patient and wife regarding risks of elective procedure versus emergency procedure undertaken and decision made to proceed.

Anaesthetic Details:

The patient was given a general anaesthetic for the procedure. He was given Fentanyl 100 μg and induced with 70 mg of Propofol, and paralysed with atracurium 50 mg. His anaesthetic was maintained on air, oxygen and sevoflurane.

Surgery took 2 hours and the patient was extubated at the end of the procedure

In recovery the patients increased respiratory effort was noted so a decision was made that the patient should go to intensive care overnight for non-invasive ventilation. An arterial line was inserted, and the patient transferred.

There was some deterioration overnight but by the morning the patient was well enough to be transferred to the ward.

That evening the patient deteriorated again and died.

Learning Points

- In a patient with severe pre-existing conditions the serious risk of performing elective surgery should be weighed up especially in those who are asymptomatic.
- Like all end stage disease patients, decompensation can occur with the smallest insult to their physiology.
- Preoperative discussions with the patient and family are very important
- An ICU bed should have been booked if going ahead with this case as it was predictable that the patient would require it post op.

The Committee determined that correctable factors were present in 11 anaesthesia-related deaths in 2019. The causal or contributary factors related to these deaths are varied (n=15), with the majority being associated with anaesthetic technique (n=9), of which airway maintenance (Bii) was the major factor (n=7).

Of the 11 anaesthesia-related deaths with correctable factors, 72.7% (n=8) were classified as Category 1 deaths; and 63.6% (n=7) of patients were 65 years of age or older.

Table 3: Factors identified in anaesthesia-related deaths, 2019 (n=53).

Causal or contributory factors	Frequency count
A Pre-Operative	**1**
Ai Assessment	1
Aii Management	0
B Anaesthetic technique	**9**
Bi Choice or application	1
Bii Airway maintenance	7
Biii Ventilation	1
Biv Circulatory support	0
C Anaesthesia drugs	**3**
Ci Selection	0
Cii Dosage	2
Ciii Adverse event	1
Civ Inadequate reversal	0
Cv Incomplete recovery	0
D Anaesthetic management	**0**
Di Crisis management	0
Dii Inadequate monitoring	0
Diii Equipment failure	0
Div Inadequate resuscitation	0
Dv Hypothermia	0
E Post-Operative	**2**
Ei Management	1
Eii Supervision	1
Eiii Inadequate resuscitation	0
F Organisational	**0**
Fi Inadequate supervision or assistance	0
Fii Poor organisation	0
Fiii Poor planning	0
G No correctable factor	**42**
H Medical condition of patient a significant factor	**47**

Note: The frequency count adds up to more than 11, because some anaesthesia-related deaths have more than one causal or contributing factor identified.

2.2 Non-Related Anaesthesia Deaths – Group B Deaths

Anaesthesia not contributory – Category 4, 5 & 6

Group B deaths capture Categories 4, 5 and 6. These are deaths where the administration of the anaesthesia is not contributory and there are surgical or other factors are implicated.

2.2.1 Category 4

Case 14 – Urology procedure

A 78-year-old male admitted for a Trans Urethral resection of a bladder tumor.

Background History:

Atrial fibrillation - Rivaroxaban ceased prior to surgery, peripheral vascular disease. Previous endocarditis with subsequent mitral regurgitation.

Anaesthetic details:

Preoperatively the patient was in atrial fibrillation at a rate of 120. His blood pressure was 120/70.

He was induced with Fentanyl 100 µg, Propofol 100 mg and a laryngeal mask inserted. His anaesthesia was maintained with sevoflurane.

Intraoperatively metoprolol 2 mg + 2 mg + 1 mg + 1 mg was given to slow the heart rate.

The case was completed in an hour and the patient transferred to recovery.

He was awake with a heart rate of 120.

A medical team review was sought, and digoxin 500 µg prescribed. This was given to the patient (duration of administration is unclear). Shortly afterwards the patient's electrocardiograph changed dramatically, and he suffered a cardiac arrest.

He was successfully resuscitated, digoxin reversed, inotropes commenced, and he was transferred to ICU.

Unfortunately, there was further deterioration in ICU with rising troponin, escalation in inotropes and multi organ failure.

The patient died 18 hours post procedure.

Learning Points

- The heart rate of patients with Atrial fibrillation may get worse during anaesthesia and surgery. Ideally a heart rate under 100 should be sought prior to embarking on elective cases.
- Anaesthetic and surgery in this case was uneventful but post operatively an event occurred which was not under the anaesthetist's control.
- Cardioactive drugs and recommended delivery times are important. They are there for a reason.
- Rapid intravenous injection of Digoxin causes vasoconstriction and reduced coronary blood flow which can induce ischemia or worsen it.
- While it can't be said for certain this was the cause of the patient dying, temporally the two events were related.

ECG PANELS

Image 1: ECG - Pre-op - No chest pain:

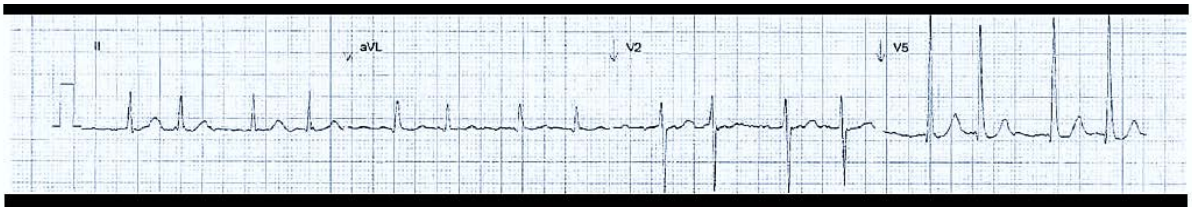
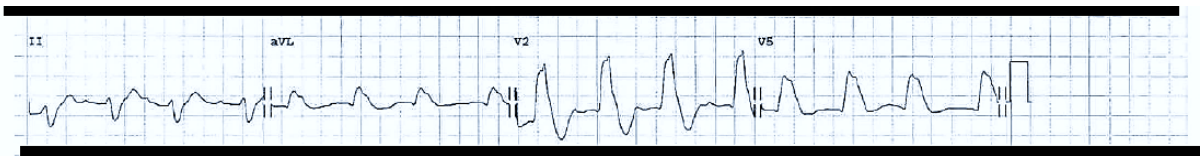


Image 2: ECG - Post Digoxin:



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.

The majority of cases (83%; n=302) reviewed by the Committee were identified as having no anaesthetic or surgical factors involved, with 274 (90.7%) classified as inevitable deaths.

Of the 302 deaths reviewed, 89% of patients were assessed as ASA grade 4 or 5 - being critically unwell or not expected to survive for 24 hours - with 67% aged 65 years or over.

Further analysis on inevitable deaths identified that cases were distributed across several surgical specialties and non-invasive procedural areas, with abdominal surgery and non-invasive surgery (Cardiac, Endoscopy, Radiological) the most frequent.

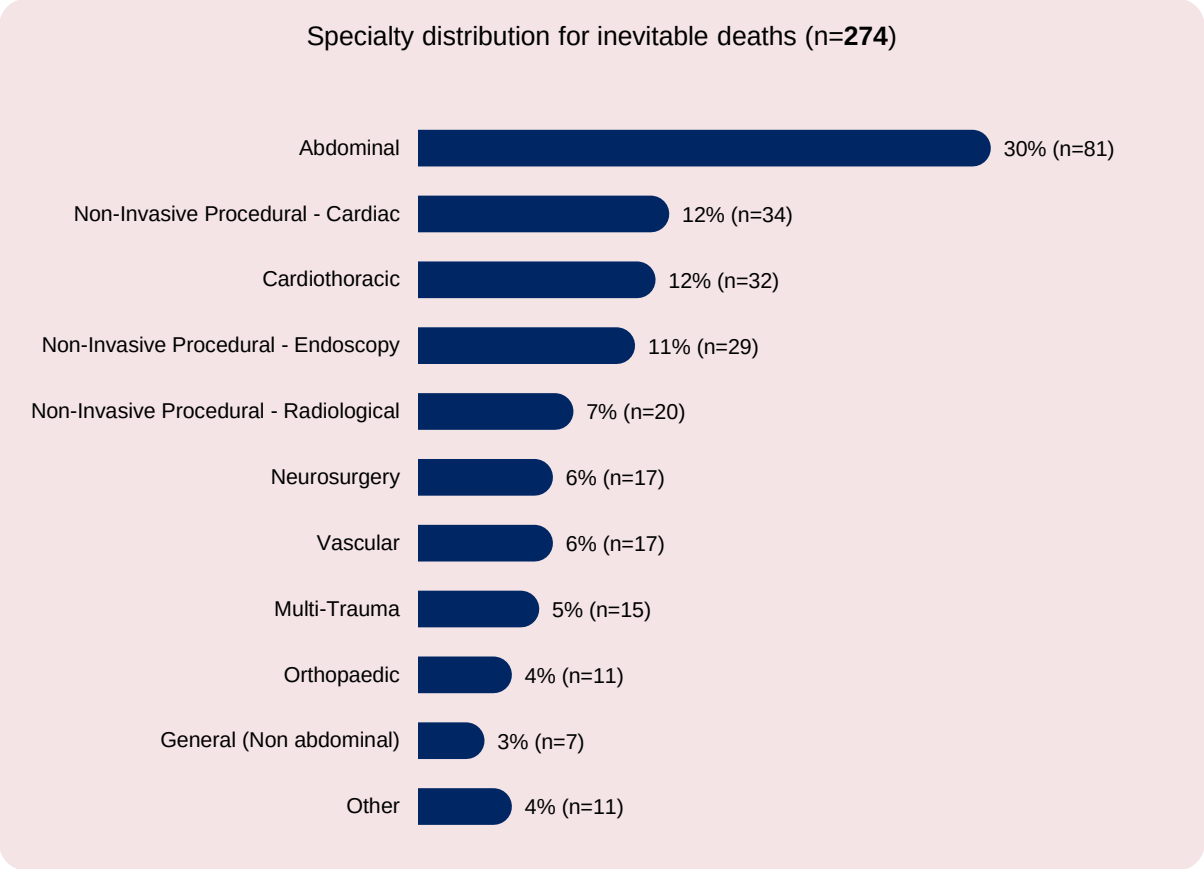


Figure 1: Specialty distribution for inevitable deaths determined by SCIDUA in 2019 (n=274)

Note: The grouping 'Other' includes: Other - Nil, Other - Obstetric, Other - Resuscitation, Urology.

2.2.2 Category 5

Case 15 – Vascular surgery

An 86-year-old female who underwent an emergency aortic aneurysm repair.

Background History:

Known hypertension, previous cerebral vascular accident (CVA) and liver abscess.

Anaesthetic details:

The patient was transferred to operating theatre critically unwell with hypovolemic shock. A rapid sequence induction was given. Midazolam 1 mg, Ketamine 60 mg, Fentanyl 50 µg and Suxamethonium 100 mg.

A supraceliac clamp was applied by the surgeon.

10 minutes later the patient suffered a ventricular tachycardia arrest. She was shocked once with return of cardiac output.

The surgery was challenging and during the case the patient was given 6 units packed cells, 2 units FFP, 5 units cryoprecipitate, 2 litres of Albumin, 3 litres of crystalloid and 1.6 litres of cell saver blood.

Towards the end of the case there was profound metabolic derangement - Lactate > 200 mmol/L. She was now on noradrenaline, Adrenaline and vasopressin.

A transoesophageal echo was performed prior to clamp release which showed stable cardiac function.

On release of the clamp there was profound shock. Enormous doses of inotropes unable to maintain perfusion.

She was taken to ICU where she was deemed unsupportable and died.

Learning Points

- Ruptured aortic aneurysm patients have a very poor prognosis.
- Elderly patients with ruptured aortic aneurysms have very bad outcomes.
- This is not a criticism of what was done, but while it is difficult given the time constraints involved in an emergency, some attempt should be made to contact the next of kin and clarify what the patient's wishes would have been given the current situation prior to embarking on this type of surgery.

2.2.3 Category 6 Deaths

Incidental deaths which could not reasonably be expected to be foreseen.

Case 16 – Vascular Surgery

A 77-year-old male who presented for a thrombectomy and revision arteriovenous fistula.

Background History:

Laryngeal nerve palsy with oropharyngeal dysphasia, End stage renal disease, Ischemic heart disease

Moderate aortic stenosis, Atrial fibrillation

Anaesthetic Details:

Ultrasound guided supraclavicular nerve block performed with 75 mg ropivacaine and 75 mg lignocaine.

Cephazolin 2 g given during the procedure and the surgery proceeded uneventfully.

The following evening while in the dialysis unit a rapid response was called for vomiting and coughing. The patient's condition continued to deteriorate with hypoxia, acidosis and respiratory distress.

A family meeting was organised and a decision made to palliate the patient.

The patient died 26 hours post procedure.

Learning Points

- This was an incidental event, not related to the anaesthetic or surgical procedure.

2.3 Deaths not able to be Assessed – Group C Deaths

There were 8 cases classified as un-assessable deaths. It is important to note that both 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 information provided.

2.3.1 Category 7

Case 17 – General Surgery

A female in her early thirties was admitted for elective laparoscopic gastric bypass.

Background History

Genetic Dwarfism, super-morbid obesity BMI 52. Height: 123 centimetres.

Anxiety disorder. Occasional croup with upper respiratory tract infections. Preoperative blood tests all normal.

Anaesthetic Details:

A premedication of pregabalin and diazepam was given. Despite multiple attempts, intravenous access was unable to be obtained.

Gas induction was undertaken, a laryngeal mask inserted, and spontaneous ventilation maintained. A right internal jugular line was then inserted under ultrasound guidance. Propofol 50 mg, rocuronium 100 mg , ketamine 10 mg, dexmedetomidine and magnesium given.

Endotracheal intubation performed using a size 6 tube. It was a grade 1 laryngoscopy.

There was immediate difficulty in ventilation. The tube was withdrawn 2 cm but ventilation was still difficult.

Bradycardia then developed with a decrease in end tidal carbon dioxide and unrecordable oxygen saturations.

An arrest was called and Adrenaline administered. The patient became asystolic and CPR commenced. A total of 12 mg of Adrenaline was given during the resuscitation phase. The patient remained in a pulseless electrical activity rhythm.

A transoesophageal echo showed global dysfunction.

Return of spontaneous cardiac output occurred approximately an hour post arrest.

The patient was then commenced on an Adrenaline infusion and transferred to ICU.

She was extubated the next day. A trans thoracic echo showing no abnormalities.

30 hours post extubation she developed acute respiratory distress and required reintubation. Once again ventilation was difficult, and this time she suffered refractory hypoxia and died.

Mast cell tryptases were normal.

Learning Points

- Bronchomalacia and subglottic stenosis is common in genetic dwarfism.
- Deterioration occurred after intubation and institution of positive pressure ventilation.
- Air trapping can occur as a result and present as difficult ventilation.

2.3.2 Category 8

Case 18 – General Surgery

A 64-year-old male for elective laparoscopic fundoplication.

Background History:

Ex-smoker, depressive disorder, otherwise the patient was well.

Anaesthetic Details:

Induced with propofol 170 mg, paralysed with cisatracurium 7 mg and intubated for the procedure.

Fentanyl used for analgesia and anaesthesia maintained with nitrous oxide and sevoflurane.

Surgery took 2 hours to complete and the patient was extubated and taken to recovery.

Apart from nausea his recovery stay was unremarkable and was transferred to the ward an hour later.

Hourly observations continued on the ward.

Three hours after returning to the ward the patient was found unconscious. An arrest was called and resuscitation commenced. The patient was asystolic throughout.

He was pronounced dead 4 hours post procedure.

Learning Points

- An Autopsy in this case would have been useful in helping elucidate the cause of death, however it was not performed at the request of the family.

2.4 Maternal Deaths

The committee reviewed two deaths concerning maternal care in 2019.

Case 19

A female in her mid-thirties presented by ambulance to Emergency after a suspected cardiac arrest at home.

Background History:

25/40 gestation. Minimal antenatal care. Approximate downtime of 1 hour prior to arrival.

Anaesthetic Details:

CPR continued. Peri-mortem caesarean performed in the emergency department. A still born fetus was delivered within 10 minutes of arrival. Oxytocin given.

Bedside echo showed dilated right ventricle. Decision made to put patient on ECMO. ECMO Cannulas placed and commenced. Bleeding noted from abdominal site.

Rocuronium 50 mg was given and the patient was transferred to the operating theatre for an exploratory laparotomy and control of bleeding. A Bakri balloon was inserted, uterus closed, and the abdomen was packed.

The patient was transferred to CT after theatre. CT Head showed gross cerebral oedema and CT Chest showed extensive bilateral pulmonary embolism.

The patient died the following day.

Learning Points

- Pregnancy is not without risk
- It is very important to have good antenatal care.
- Pulmonary embolism can occur at any time during pregnancy and can be fatal.

Case 20

A female in her early twenties presented for an emergency caesarean section.

Background History:

Nil medical history of note. Normal BMI. Uneventful pregnancy.

Two previous vaginal deliveries. Admitted to hospital in labour - epidural inserted and worked well during the day. Emergency cesarean called for failure to progress 14 hours after being admitted to hospital.

Anaesthetic Details:

Epidural topped up with 10 mls 2% xylocaine with Adrenaline. Block established to T4 dermatome. Surgery commenced and a live infant was delivered by hand 20 minutes later.

- Carbetocin 100 µg given post-delivery.
- Poor uterine tone was noted.
- Blood loss approximated at 700 mls by this stage.

Syntocinon infusion commenced. HR 99 and BP 102/53. Ongoing poor uterine tone. Blood loss 1 Litre.

The uterus was exteriorized. Carboprost 250 µg was given into the myometrium and a B Lynch Suture performed. IV fluid resuscitation and a metaraminol infusion was running. Ergometrine 250 µg was given intramuscularly (IM), with 250µg IV. Carboprost 250µg IM was given.

The consultant obstetrician was called. Haemostasis was achieved 40 minutes post-delivery. Estimated blood loss was 1.5-2L.

Venous blood gas: PH 7.32; PCO_2 37; BE -6; Hb 9.

2.5L Crystalloid was given by this stage. The patient was very nauseous. HR was 145 and BP 120/54 (unsupported).

Sats were 100% on nasal prongs.

The patient then fell unconscious and foam was noted in the mouth. An emergency was declared.

She was intubated with suxamethonium. No recordable blood pressure or pulses, so CPR commenced. Adrenaline 1 mg given.

Return of spontaneous cardiac output occurred in 2 minutes. A metaraminol infusion was running at 40 mls/hr. The end tidal Carbon dioxide was 20 mmHg and BP 45/14. Then a PEA arrest occurred. Adrenaline 1 mg was given, and ROSCO occurred at 4 minutes. HR was 166 and BP 116/83. The $ETCO_2$ was 27 mmHg.

An Adrenaline infusion was commenced, and an arterial line inserted. BP was 65 systolic.

Arterial Blood Gases: pH 6.96; pO_2 98p;

CO_2 60; BE -18; Lac 9.4; Hb 76.

20 minutes later a PEA arrest occurred. Transthoracic echo showed echogenic material in right atrium. ROSCO 10 minutes following but only lasting 1-2 minutes. Further CPR for 40 minutes. A repeat echo showed ventricular standstill.

She died 2 hours after giving birth.

The final blood results during resuscitation showed Hb 69; Platelets 30; INR 2.8; PT 36; Fibrinogen 0.8.

An autopsy was carried out which showed:

Blood Tryptase levels were normal;

Lung sections showing subtle features of amniotic fluid embolism associated with micro thrombi in small blood vessels.

Learning Points

During caesarean sections medical professionals should be aware of:

- Hypovolaemia - this can occur very quickly especially with an open uterus.
- Amniotic Fluid embolism - This occurs more frequently than we think. About 1 in 10,000 pregnancies. Of these 70% during labour, 20% during caesarean and 10% post vaginal birth.
- Coagulopathy due to disseminated intravascular coagulation (DIC), or loss of clotting factors, during hemorrhage needs to be appreciated and corrected for in the resuscitative phase.

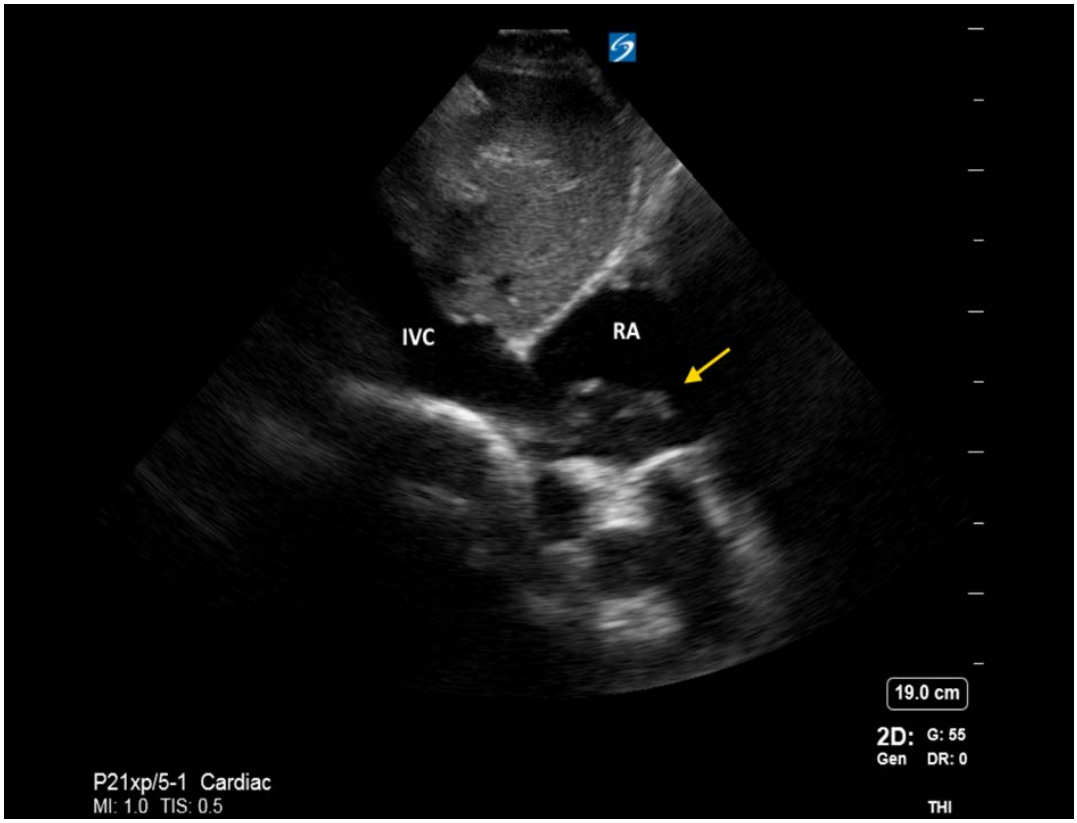


Image 3: Case 18 – ECHO image 1 - IVC-RA early

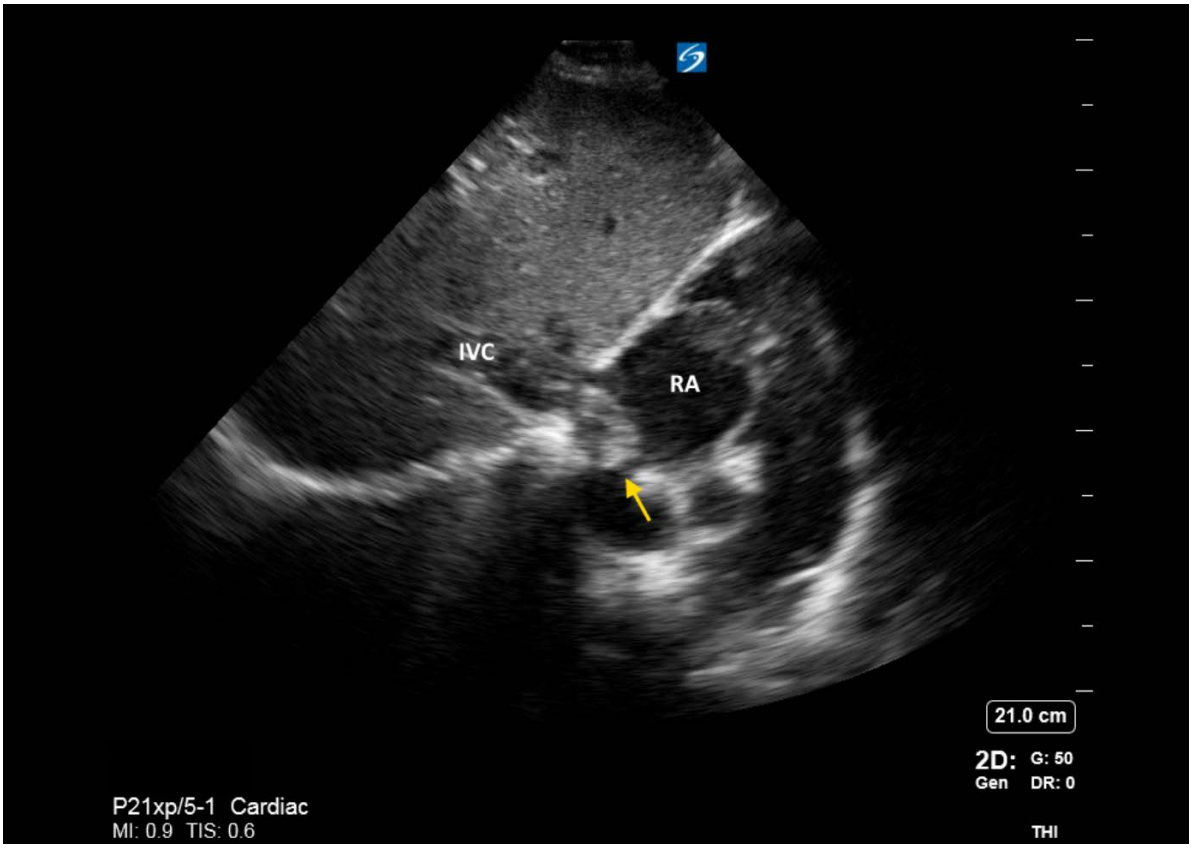


Image 4: Case 18 – ECHO image 2 - IVC-RA late

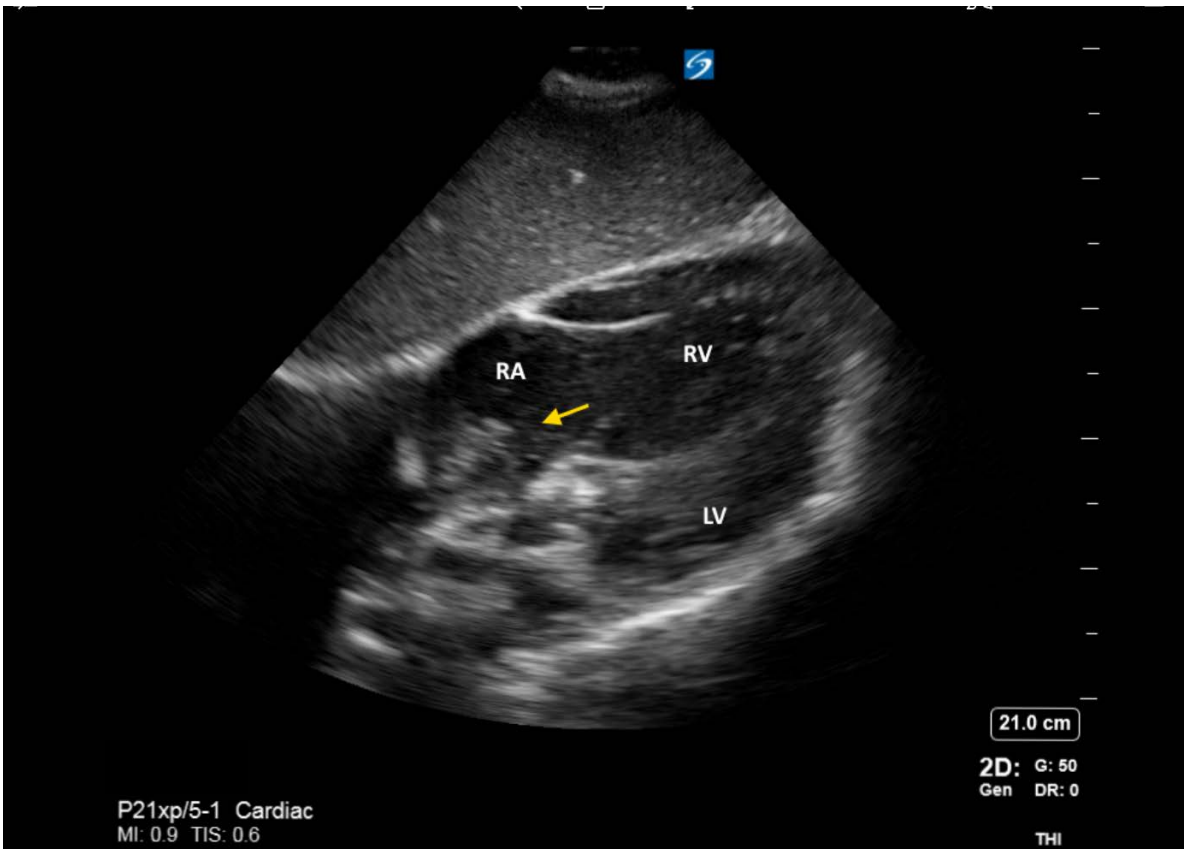


Image 5: Case 18 – ECHO image 3 - S4C view.

3. Data on Anaesthesia Related Deaths

3.1 Anaesthetists and anaesthesia

Patient outcomes are also influenced by the grade of the anaesthetist and the type of anaesthesia used. Data analysis on the 53 anaesthesia-related deaths identified that:

- Anaesthesia-related deaths where general anaesthesia was administered accounted for 75.5% (n=40) of cases reviewed by the Committee in 2019. In 87.5% (n=35) of these deaths the general anaesthetic administered by a specialist anaesthetist.
- Regional anaesthesia administered by a specialist anaesthetist in 35.8% (n=19) of deaths, with two episodes of regional anaesthesia administered by a trainee.
- Sedation was administered by a specialist in 11 of the 12 deaths reported. All patients were aged 57 years or older. One patient was also administered a general anaesthetic during their admission; whilst another was administered a general and regional anaesthetic. Both patients were admitted for orthopaedic surgery.
- Anaesthesia (General = 5; Regional = 2) was administered by a trainee anaesthetist in 9.4% (n=5) of the anaesthesia related deaths.

Figure 2: Frequency distribution of anaesthesia-related deaths (n=53) for 2019 by grade of anaesthetist and type of anaesthesia administered.

Note: The frequency count adds up to 77 as some anaesthesia-related deaths had more than one type of anaesthesia administered to the patient.

3.2 Deaths in the operating theatre

Deaths that occur under the anaesthetist's direct care, either on the operating table or shortly after in the recovery room, are of specific importance to the Committee.

Data analysis identified 55 deaths that occurred in the operating theatre or procedural room, with four attributable to anaesthesia-related factors and one classified as un-assessable. The remaining deaths (n=50) were where the anaesthesia played no part in the death; seven of which were trauma admissions, and six requiring further review by the Committee.

Table 4: Classification of all deaths (n=55) occurring in the operating theatre or procedural room, as determined by SCIDUA in 2019.

Death Type	Category	No. of cases	%
Deaths attributable to anaesthesia	1, 2 & 3	4	7.27%
Deaths in which anaesthesia played no part	4, 5 & 6	50	90.91%
Un-assessable deaths	7 & 8	1	1.82%
Total		**55**	**100%**

Analysis of the four deaths attributable to anaesthesia within the operating room identified a 50% split between 'scheduled' (n=2) and 'urgent non-emergency' (n=2) surgery; the latter status allowing for medical optimisation prior to surgery.

Table 5: Operating theatre deaths (n=4) attributable to anaesthesia, assessed in 2019.

Specialty	Age	Female	Male	ASA	Urgency Type
Cardiothoracic	73	1	-	4	Scheduled
Non-Invasive Procedural - Endoscopy	57	-	1	4	Scheduled
Vascular	45	1	-	3	Urgent Non-emergency
Orthopaedic	83	-	1	3	Urgent Non-emergency

Data analysis on the gender distribution for deaths occurring in the operating theatre or procedural room, where *anaesthesia played no part*, is shown by surgery specialty below.

Of the 50 deaths, 58% were male and 42% female, with 'non-invasive procedural – cardiac' the most frequent specialty (n=17). Cardiothoracic and abdominal specialities were equally represented (n=6), as were non-invasive procedural – endoscopy and multi-trauma (n=5).

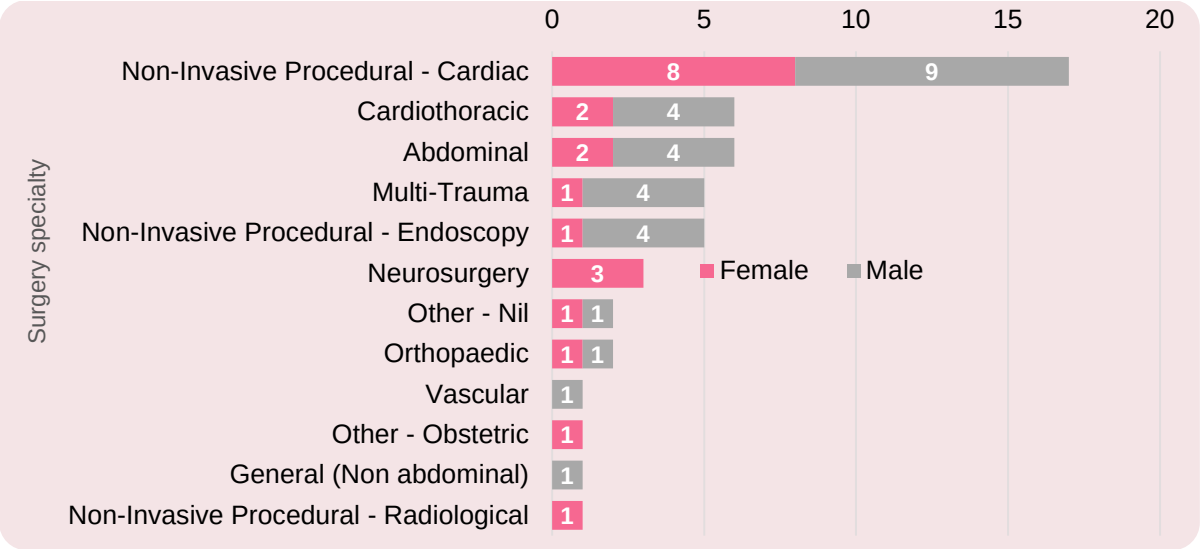


Figure 3: Distribution of gender across surgery specialty for deaths in which anaesthesia played no part (n=50) that occurred in the operating theatre or procedural room for 2019.

3.3 Age and gender

Data analysis identified that anaesthesia-related deaths classified by the Committee in 2019 occurred more often in males (n=30) than females (n=23). The age range spanned 95 years, with deaths from patients aged 6 years up to 101 years.

The majority of these deaths (62%; n=33) occurred in patients aged 81 years or older.

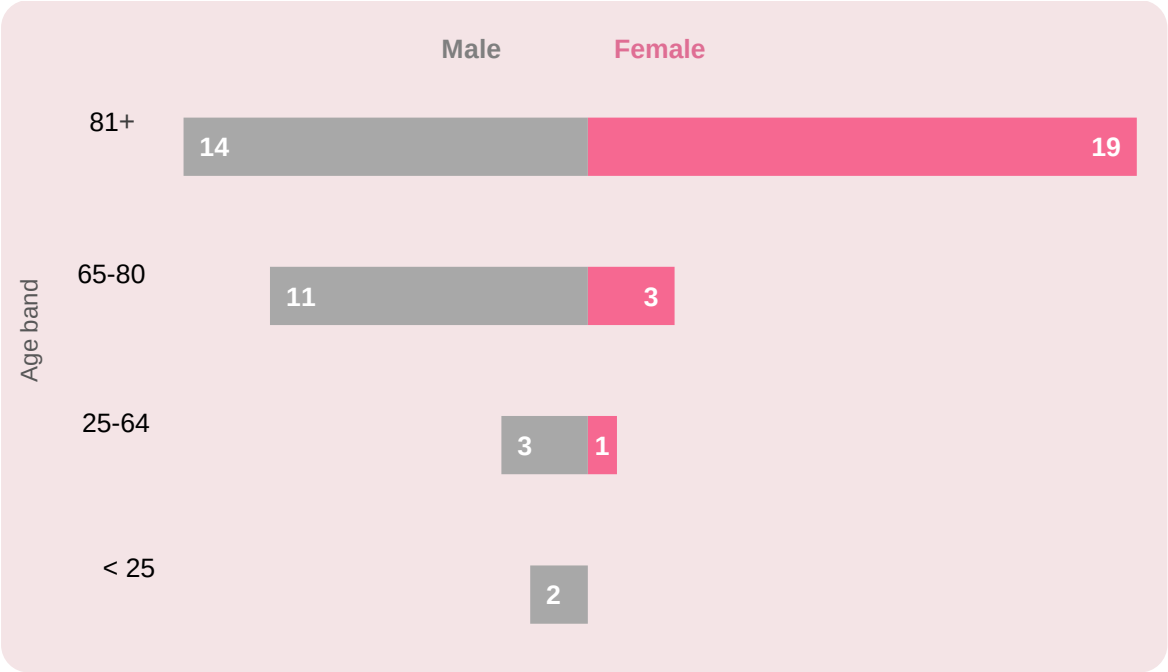


Figure 4: Age and gender distribution for anaesthesia-related deaths (n=53) in 2019.

3.4 ASA physical status

The American Society of Anesthesiologists (ASA) Physical Status Classification System has been used for over 60 years to assess and grade patients according to their pre-anaesthesia health to assist with predicting peri-operative risk factors.

In December 2020, the classification system was amended to include clear examples (adult, paediatric and obstetric) for each classification. Refer to *Appendix D* for the complete list.

Data analysis identified the majority of anaesthesia-related deaths (62%; n=33) were patients assessed as ASA grade 3 or 4 and aged 81 years or older. When compared to section 3.3 Age and gender; this outcome demonstrates that all anaesthesia-related deaths in this age group were assessed as ASA grade 3 or 4. This outcome supports the view that higher anaesthetic risks exist for elderly patients, who typically have more co-morbidities.

Only one anaesthesia-related death was a patient assessed as ASA grade 5; i.e. a moribund patient who is not expected to survive without the operation.

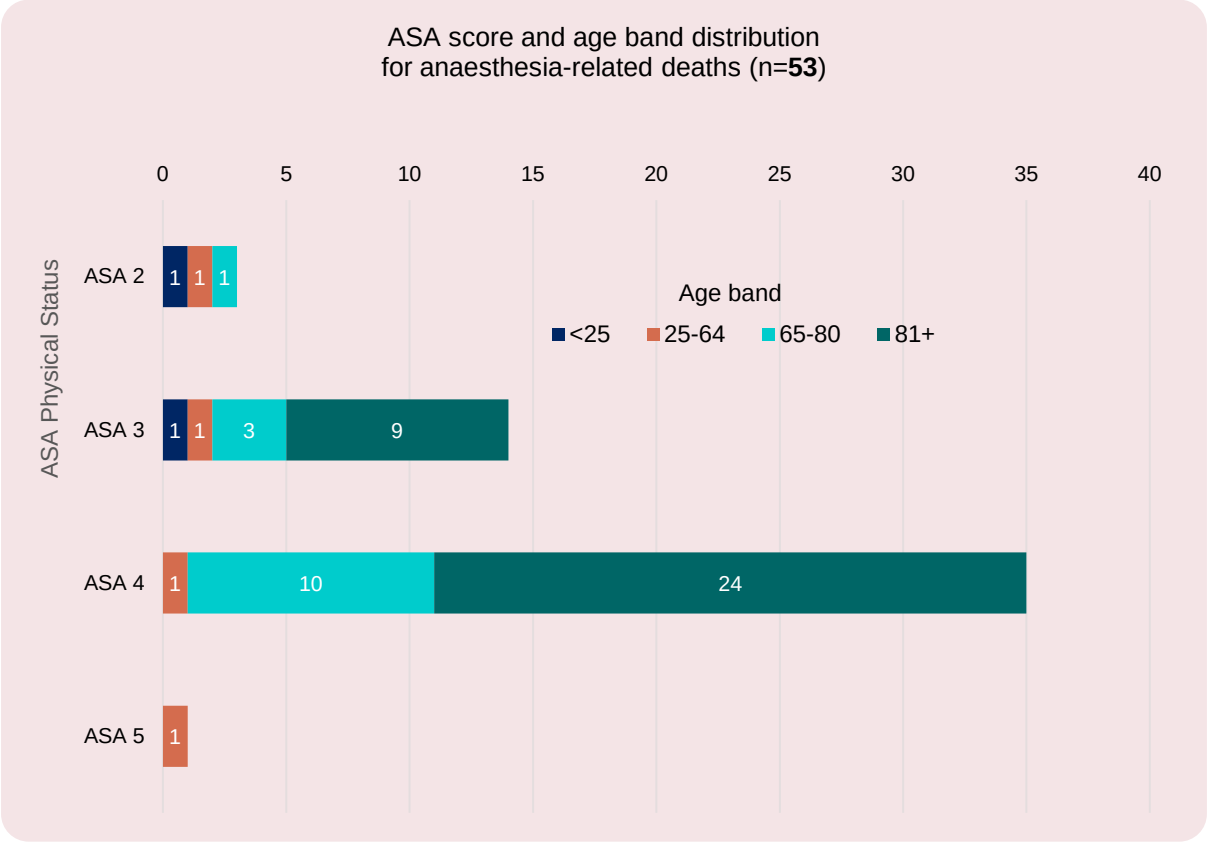


Figure 5: Age distribution against ASA score in anaesthesia-related deaths for 2019 (n=53).

3.5 Hospital Level Classifications

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 [3], as follows:

Table 6: Description of hospital level classifications.

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 **Level 5 P**	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.*

[3] 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

3.6 Hospital Level Distribution

Data analysis on the 53 anaesthesia-related deaths identified that:

- 43.40% of anaesthesia-related deaths (n=23) occurred in Metropolitan Public Teaching hospitals, with 79% of anaesthesia-related deaths (n=42) occurring in Hospital Levels 5, 5P and 6. However, these hospital types and levels typically perform higher volumes of complicated and emergency surgeries.
- 35.85% of deaths (n=19) occurred in Rural Public hospitals
- 18.87% of deaths (n=10) occurred in Metropolitan Public Non-teaching hospitals
- 21.89% of deaths (n=1) occurred in a Metropolitan Private hospital
- 87.5% of deaths in Level 5 hospitals (n=14) were classified as Category 3 deaths; having both surgical and anaesthetic factors involved. Analysis on the Category 1 deaths identified that these patients had complications of pulmonary aspiration which occurred on induction of general anaesthesia.

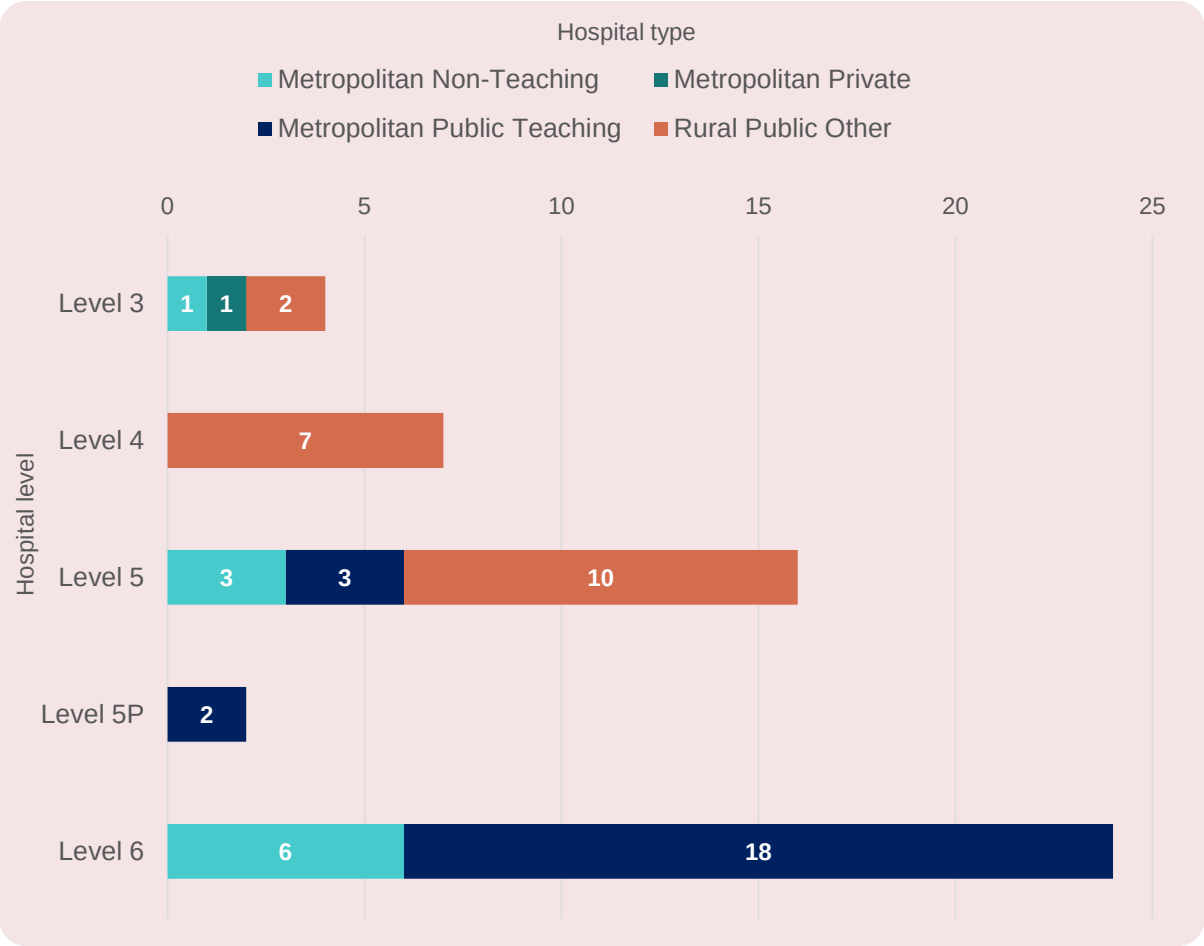


Figure 6: Distribution of anaesthesia-related deaths by hospital type for 2019 (n=53).

Note: Additional analysis by Hospital Level and Hospital Type is available at Appendix F.

3.7 Location of Death

SCIDUA assesses deaths within 24 hours of an anaesthesia or sedation being administered to a patient, but it is important to understand where in the hospital the death occurred. This enables potential improvements in post-operative care to deliver better patient outcomes.

- 53% (n=28) of anaesthesia-related deaths occurred in intensive care units (ICU) or high dependency units (HDU), of which 15 patients were classified as ASA grade 4 and 9 patients classified as ASA grade 3.
- As mentioned previously, 62% of all anaesthesia-related deaths (n=33) were patients assessed as ASA grade 3 or 4, and aged 81 years or older.
- 25% (n=13) of anaesthesia-related deaths occurred in the general ward
- 11% (n=6) of deaths occurred in the recovery room, all of which were patients assessed as ASA grade 4, and were an equal representation of male and female.
- 8% (n=4) occurred in the operating theatre, 3 of which occurred at Level 6 hospitals.

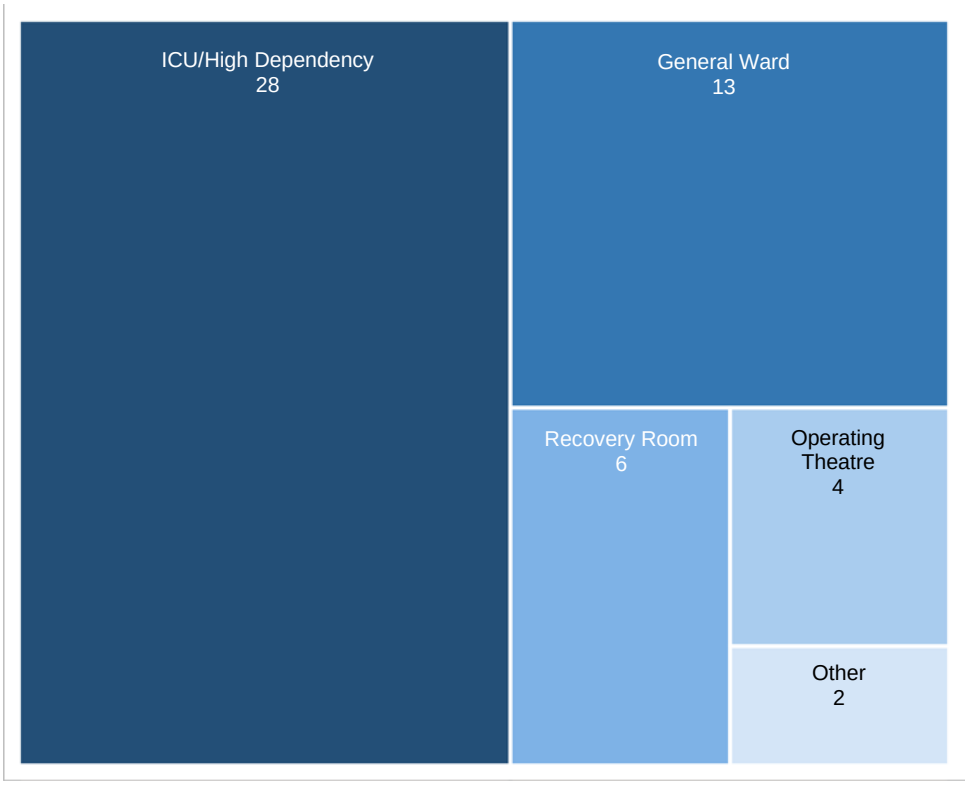


Figure 7: Distribution of anaesthesia-related deaths by location in the hospital for 2019.
Note: 'Other' represents two deaths that occurred en-route to hospital.

4. Notifications of Death over 5 years

This section of the report continues from the data sets provided in the 2018 report, with a refresh of the data occurring on 5 November 2020. Trends are reported over a five-year period (2015-2019) from the notifications reported to SCIDUA by participating hospitals and medical practitioners for the deaths that occurred in each calendar year.

Typically, there is a 5-10% roll-over of notified deaths for the calendar year which are classified by the Committee in the following year. For example, there were 342 deaths notified for 2019, yet the Committee classified 363 deaths in the 2019 calendar year.

SCIDUA welcomed the inclusion of the Northern Beaches Hospital data this year, although overall, the activity for private hospitals still remains low, with only 88 notifications received for the reporting period. Private hospitals and health facilities are reminded of their legal obligation under the *Public Health Act 2010* to report to SCIDUA.

4.1 Notifications of Death by Calendar Year

Data analysis on the 1,693 notifications of death and submitted "Form of Notification" over the five-year period indicates that while 2017 reported the highest number of deaths (n=394), 9.39% (n=37) of forms did not complete the reviewed process due to being incomplete or excluded.

While 2018 and 2019 shows a decrease in the number of notifications (320 and 342, respectively) it also shows a decrease in incomplete (5 & 8) and excluded (12 & 10) forms, indicating an increase in the quality of notifications and forms submitted.

Overall, 85.39% of deaths were classified as 'deaths in which anaesthesia played no part'.

- The highest number of notifications was in 2017 (n=394) and the lowest in 2015 (n=293).
- Similarly, the lowest number of deaths attributable to anaesthesia was in 2018 (n=28) and the highest in 2015 (n=56).

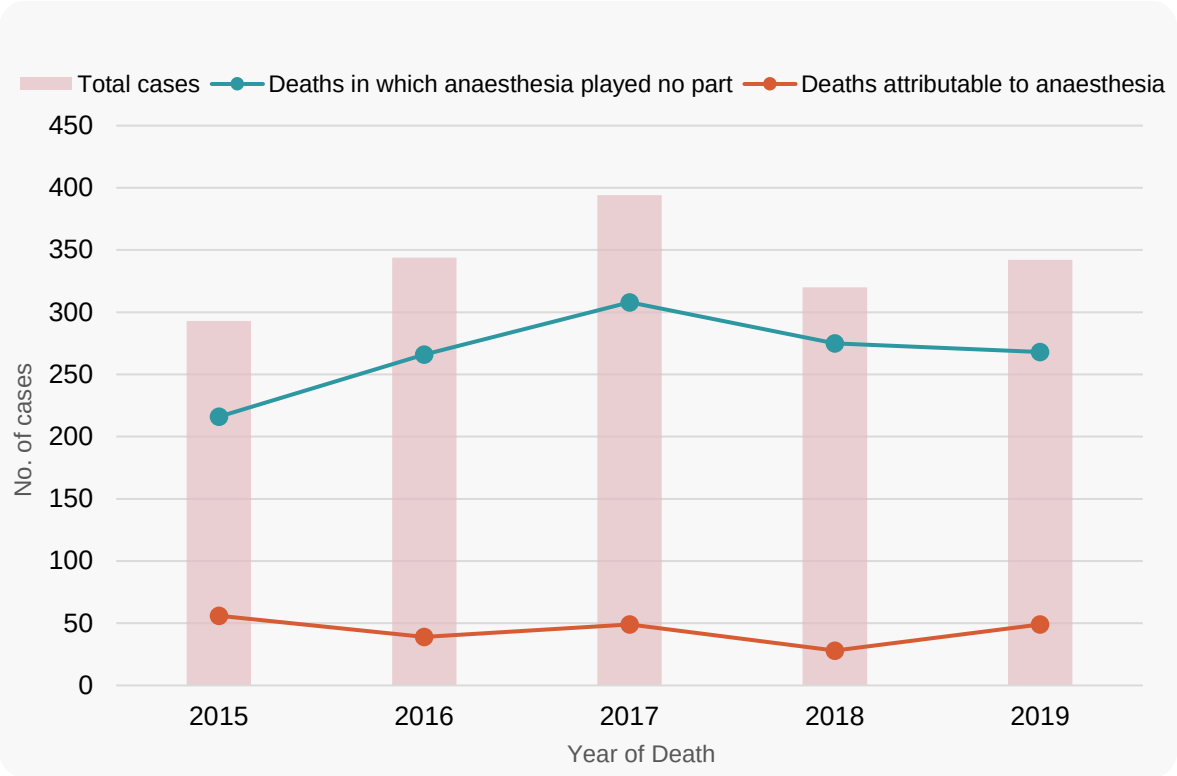


Figure 8: Comparison of deaths (n=1,693) notified to SCIDUA occurring by calendar year.

Note: Additional analysis on deaths by calendar year is available at Appendix F.

4.2 Notification of Death by Quarterly Submission

Over the five-year reporting period we can see a decline in the number of private hospital notifications, from 26 in 2015 to 14 in 2019.

95% of notifications are reported on deaths that occur in the public health system, with an average of 80.25 notifications per quarter. The variances in high-low represent the reporting backlog some hospitals experience, with a trending decline towards the end of the calendar year when the two-week closure comes into effect and staffing numbers are reduced.

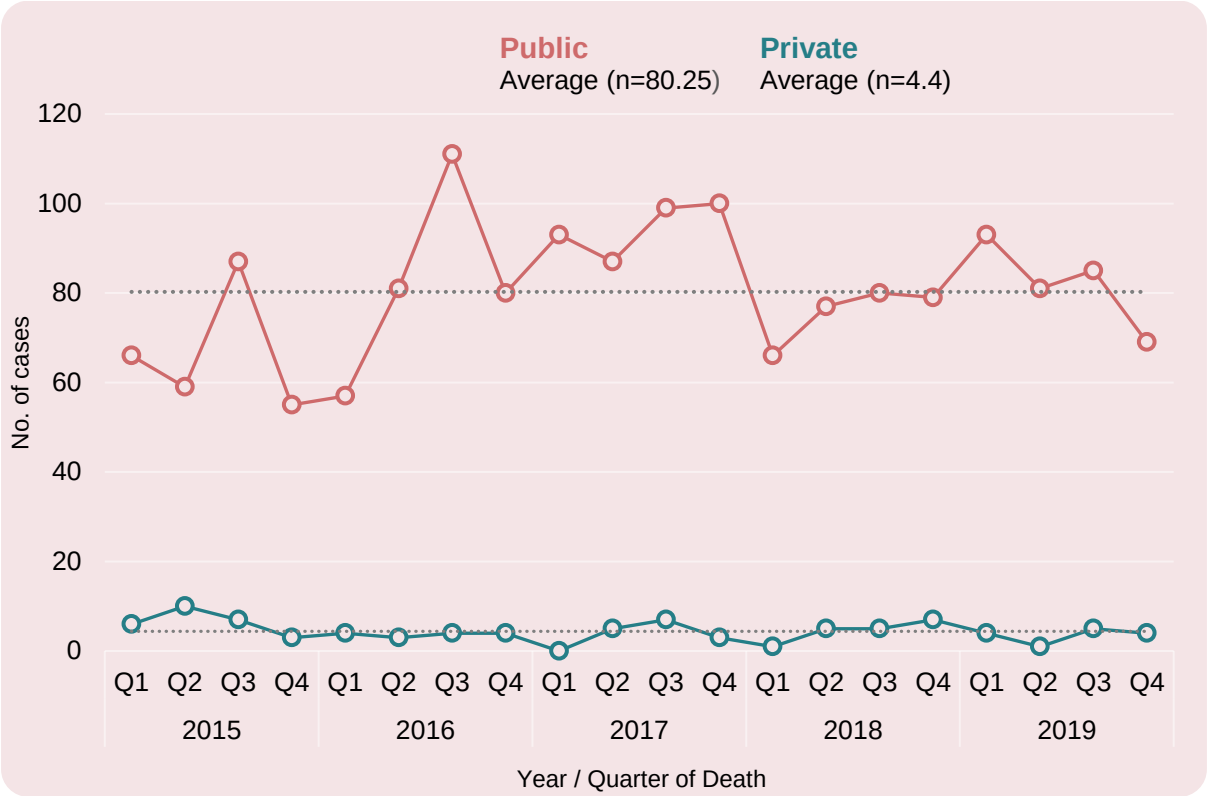


Figure 9: Quarterly notifications of death to SCIDUA for the calendar years 2015-2019.

Note: Additional analysis on submissions of notifications of death is available at Appendix F.

4.3 Notification of Death by Hospital Group

The Clinical Excellence Commission encourages Local Health Districts and Specialty Health Networks to report notifiable deaths using the admitted patient death screening tool[4]. SCIDUA encourages over-reporting as it helps to foster a positive safety culture for incident reporting. Over-reporting also allows the SCIDUA Chairman to review deaths that occur outside of the 24-hour period to determine whether there was a catastrophic event that contributed to the patient death following the administration of anaesthesia or sedation.

Data analysis on the days variance for death notifications by Hospital Groups shows a range of notifications from 78 to 2 per annum over the five-year period. Obviously, those Hospital Groups with a higher number of tertiary facilities and higher rate of surgeries/procedures, are represented with more notifications of death per annum. However, the availability of dedicated staffing resources also helps to facilitate robust identification of cases, resulting in higher quality notifications which meet the criteria of SCIDUA.

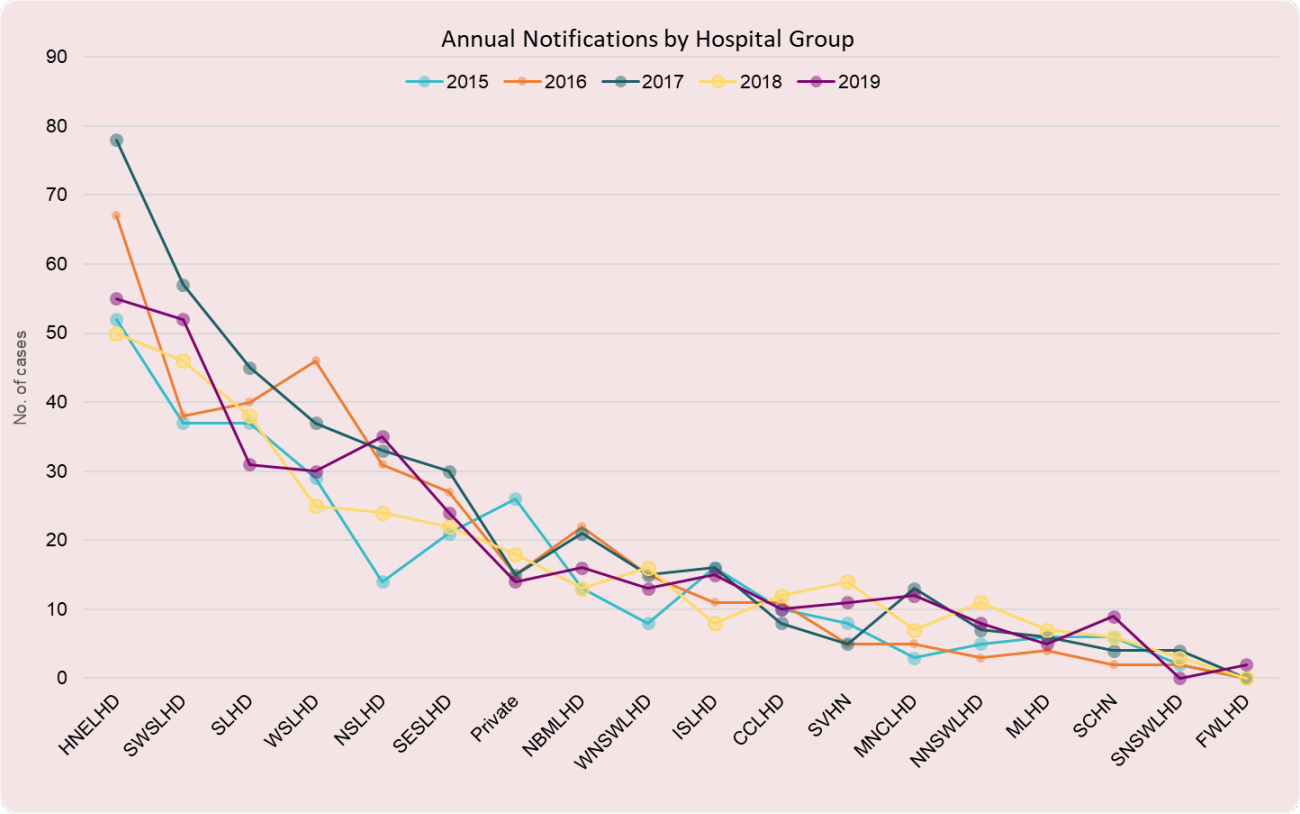


Figure 10: Distribution of deaths (n=1,693) notified to SCIDUA by calendar year for hospital groups over a five-year period (2015-2019).

Note: Additional analysis on Hospital Groups is available at Appendix F.

[4] The Admitted Patient Death Screening Tool is available at: https://www.cec.health.nsw.gov.au/__data/assets/pdf_file/0010/290665/Admitted-Patient-Death-Screening-Tool.PDF

4.4 Notification of Death by Days Variance

To obtain the most accurate information from medical practitioners involved with the death of a patient that meets the criteria of SCIDUA, it is important to capture a clear recollection of events by submitting a 'Form of Notification' as soon as possible after the patient death.

Members of the SCIDUA Committee encourage medical practitioners to adopt a model of early self-notification (1-30 days after the patient death) to SCIDUA, rather than waiting for the notification from the hospital system (45 days after the end of the month in which the death occurred) to generate an email request by SCIDUA. Medical practitioners are also encouraged to contact the SCIDUA chairperson should they have any queries or concerns about the notification process or whether the death meets the criteria for SCIDUA.

Data analysis over the five-year period shows that overall, 42.5% (n=720) of deaths are self-notified by medical practitioners within 30 days of the patient death. However, there are still 32% (n=541) of notifications that are received more than 90 days after the patient death.

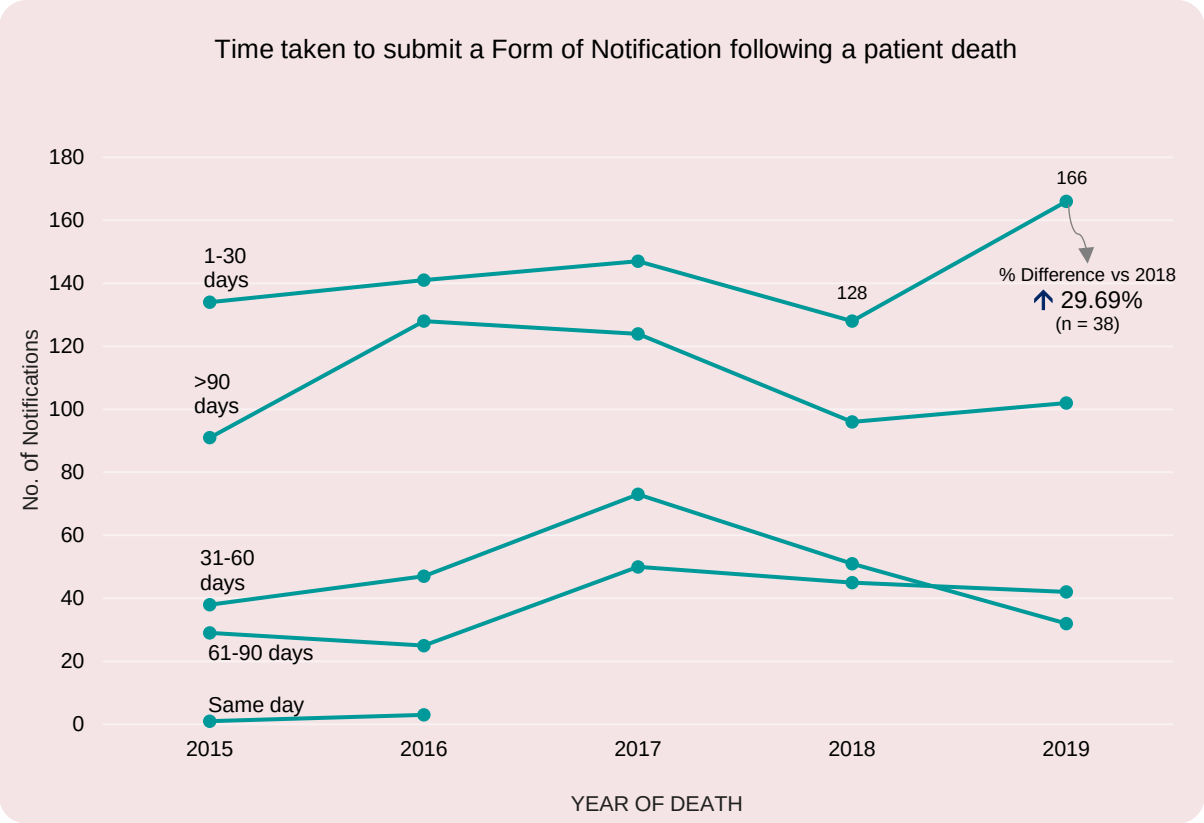
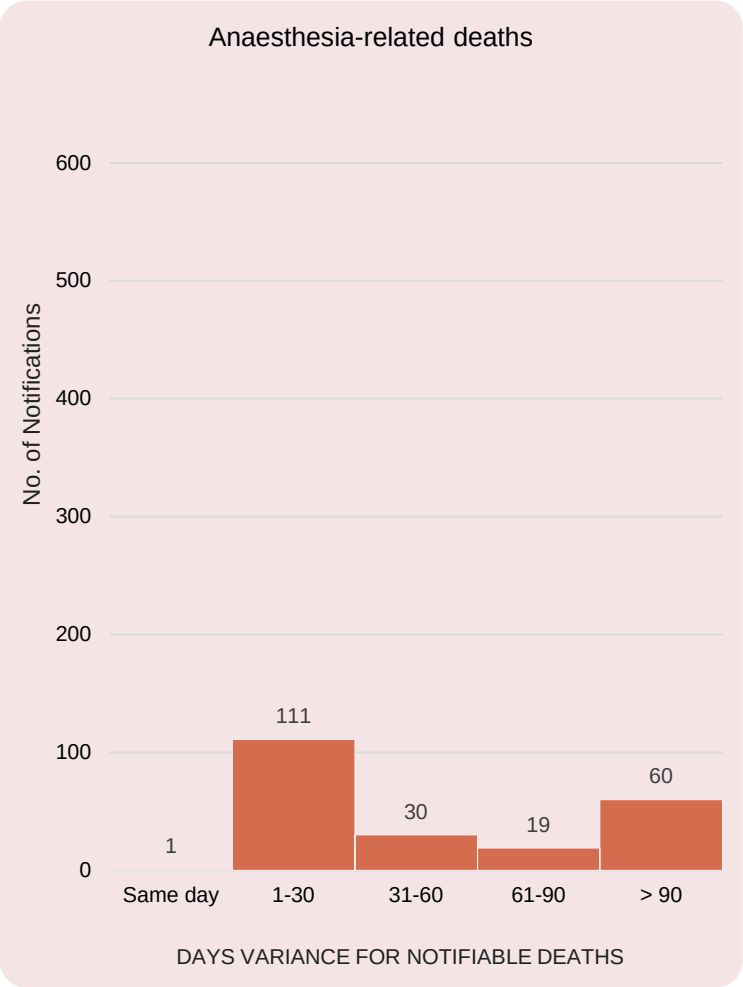


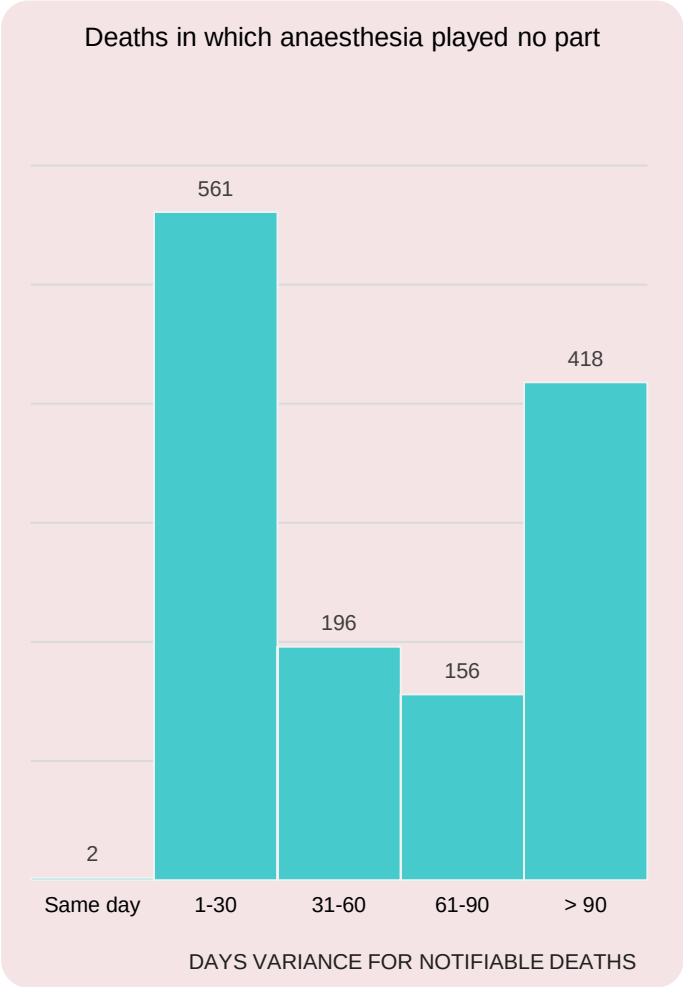
Figure 11: Time taken to submit a Form of Notification to SCIDUA following a patient death.

4.5 Days Variance for Classified Deaths

Data analysis for the five-year period on the days variance for notifications submitted to SCIDUA where the death has been classified as 'attributable to anaesthesia' (n=221) shows 64.25% (n=142) of notifications were submitted within 60 days of the patient death.

For deaths classified as 'anaesthesia played no part' (n=1,333), analysis shows 56.94% (n=759) of notifications were submitted within 60 days of the patient death.





Figures 12 and 13: Days variance for Form of Notification submissions (2015-2019), categorised by: (a) attributable and (b) non-attributable anaesthesia-related deaths.

Note: Cases classified as excluded or incomplete (n=132) are not included in this analysis.

5. SCIDUA Data over 5 years

This section of the report reviews SCIDUA deaths for each calendar year over a five-year period (2015-2019) to identify any trends in the data. The SCIDUA Program has had very few changes in its structure over its long-established history. This translates to consistent quality in the questions asked of participating anaesthetists and in the data set.

5.1 Trauma Deaths

The SCIDUA triage subcommittee classifies trauma deaths (*death due to trauma)* prior to formal review by the Committee. Most of these deaths receive an ASA score of 'E' (requiring emergency procedure) and are admitted to a Level 6 hospital with a trauma facility.

The definition of *major trauma* applies when patients of any age, are admitted to a designated NSW Trauma Service within 14 days of sustaining an injury, and:

- have an Injury Severity Score (ISS) > 12 (moderate to critically injured); or
- are admitted to an Intensive Care Unit (irrespective of ISS) following injury; or
- die 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[5].

Analysis on the deaths classified by SCIDUA as trauma-related identifies that 2019 had the highest number of trauma deaths (n=33) and 2018 had the lowest (n=17). Overall, there were 287 deaths classified as trauma, with 59 deaths identified as multi-trauma cases and 137 deaths classified as inevitable. Further analysis shows that males represented 66.4% (n=91) of all inevitable trauma deaths in the five-year period, with 72.7% (n=16) of deaths in the age group <25 years, and 71.7% (n=38) of deaths in the age group 25-64 years.

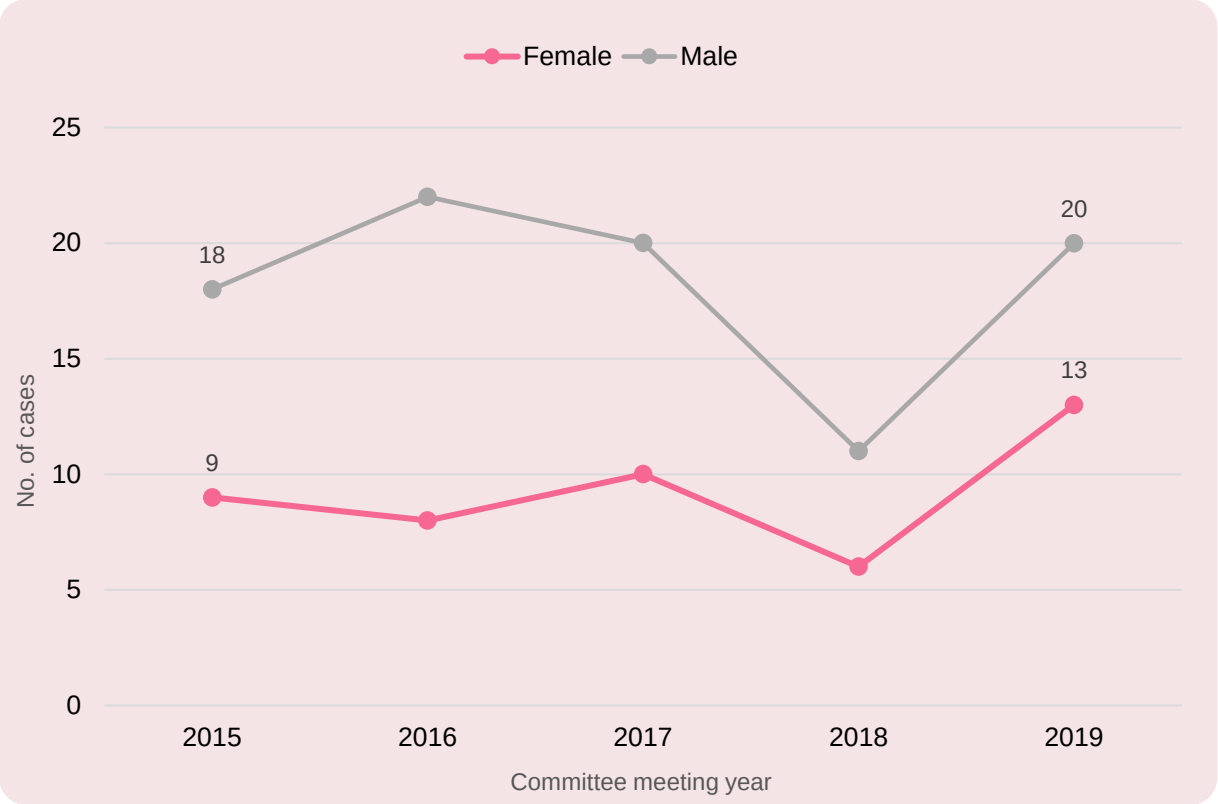


Figure 14: Inevitable trauma deaths by gender (n=137) over the five-year period (2015-2019).

[5]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

5.2 Non-Beneficial Surgery (Futile Surgery)

Futility is subject to much debate within medical and surgical care. There is no concise definition and an objective understanding is yet to find common ground. For the purpose of reviewing deaths potentially associated with anaesthesia, SCIDUA applies the concept of 'non-beneficial surgery' to help classify deaths which may otherwise be seen as futile.

These are cases where surgery is performed, when it is clear before starting, that no favourable outcome could be expected from the surgical intervention. In 2019, the Committee classified 10 such cases, with 70% classified as emergency i.e. the patient requires immediate surgery (less than 30 minutes) for a life-threatening condition, such as a ruptured abdominal aortic aneurysm. The cumulative total for cases classified as non-beneficial over the five-year period is 59.

Overall, there were 6 deaths classified by the Committee as futile surgery for the urgency type 'scheduled' (elective surgery). These cases may reinforce difficult situations where medical practitioners are presented with challenging circumstances, such as, the desire to proceed with surgery when other end of life or palliative care planning could provide alternative options, or where surgery is performed to provide comfort measures.

SCIDUA encourages all treatment team members to engage the patient and their families in a conversation about realistic outcomes when offering procedures, and giving patients and families the option of palliation, where feasible, or of establishing a ceiling of care.

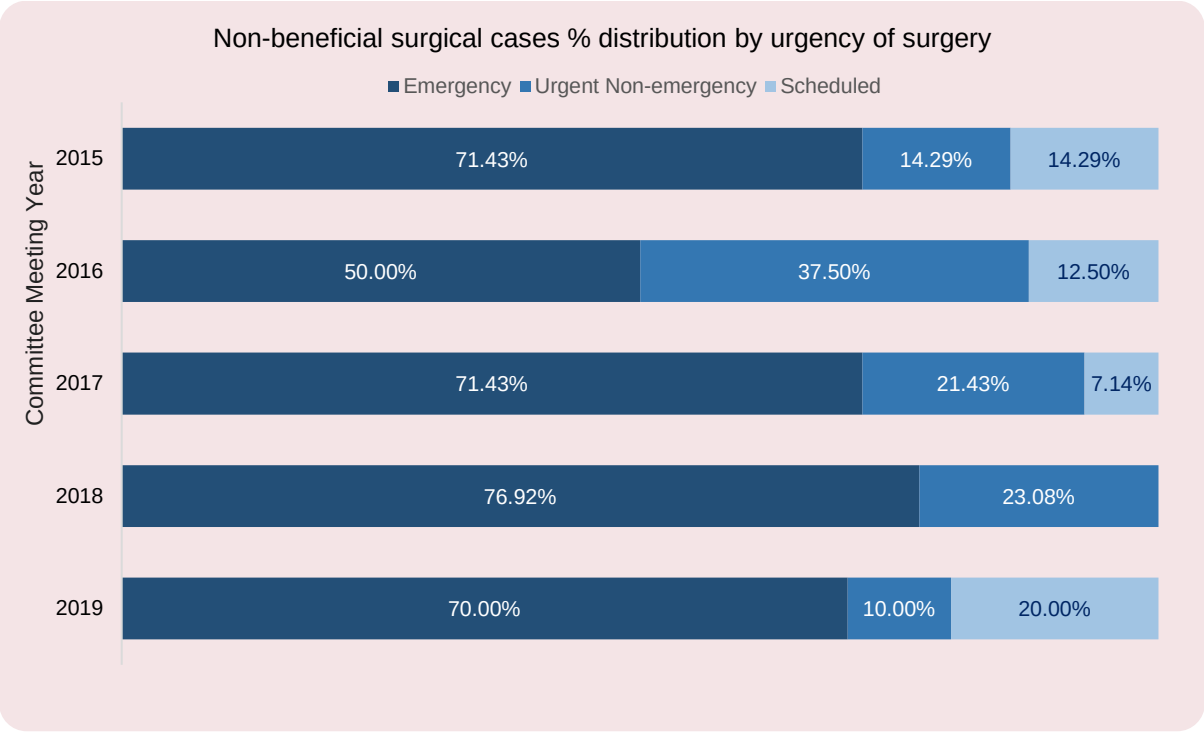


Figure 15: Distribution of cases across categories of 'urgency of surgery' for non-beneficial surgical cases over a five-year period (2015-2019).

5.3 Unassessable Deaths

Category 8 Deaths

On occasion, some of the “Forms of Notification” (FON) submitted to SCIDUA contain insufficient details. This is either when there is little known about the event, or there is a lack of other clinical information for the Committee to adequately assess and classify the death.

Every effort is made to follow-up with the medical practitioner or anaesthetic department to obtain further details on the death, however, there are a small number of deaths each year that remain unassessable and are classified as a Category 8 death. A total of 50 cases over the five-year period were determined to be unassessable by the Committee.

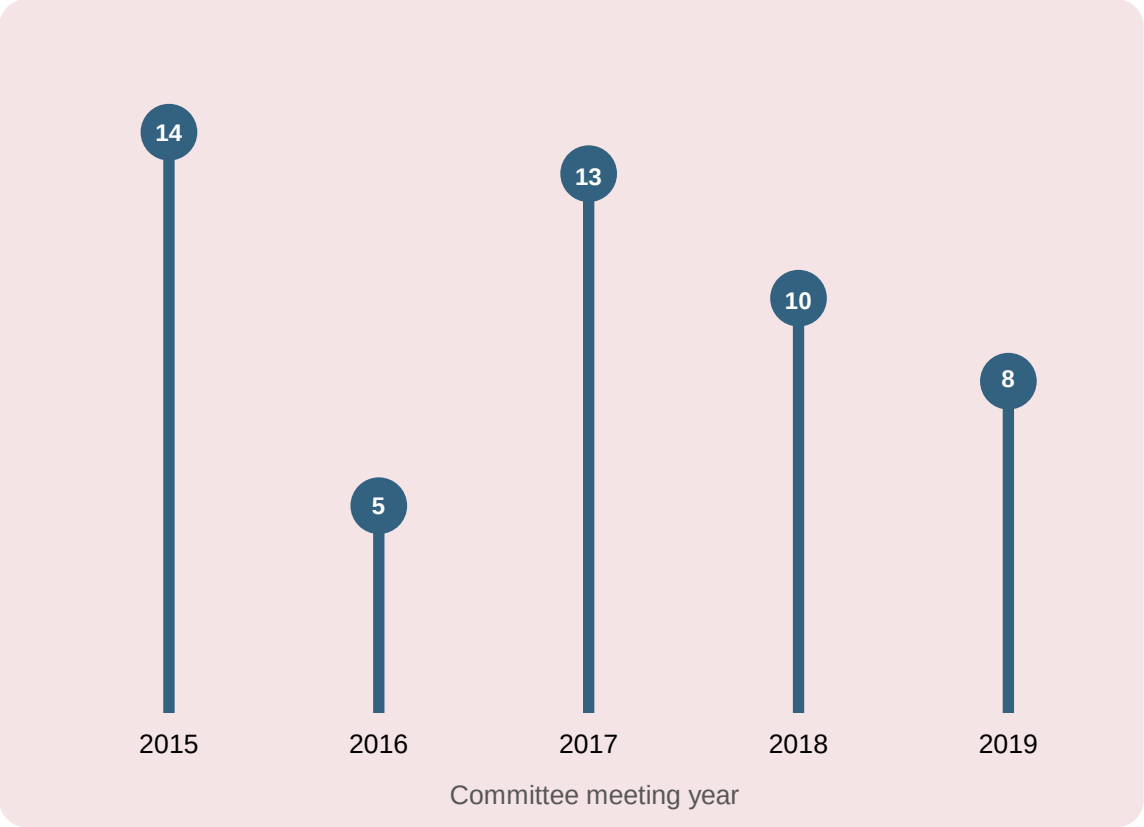


Figure 16: Unassessable SCIDUA deaths (n=50) over a five-year period (2015-2019).

5.4 Bone cement

The Committee classifies deaths where bone cement is a causal or contributory factor in the patient death. Data analysis on the five-year reporting period identified a total of 53 such deaths, with 5 deaths occurring in 2018 and 2019.

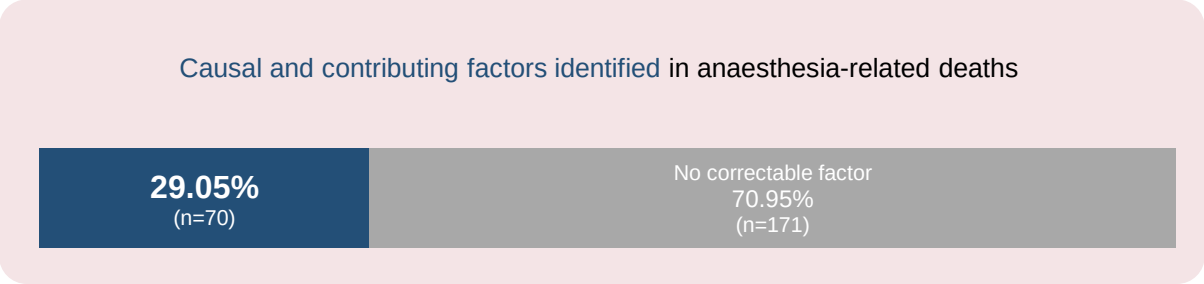
5.5 Adverse reaction to anaesthesia

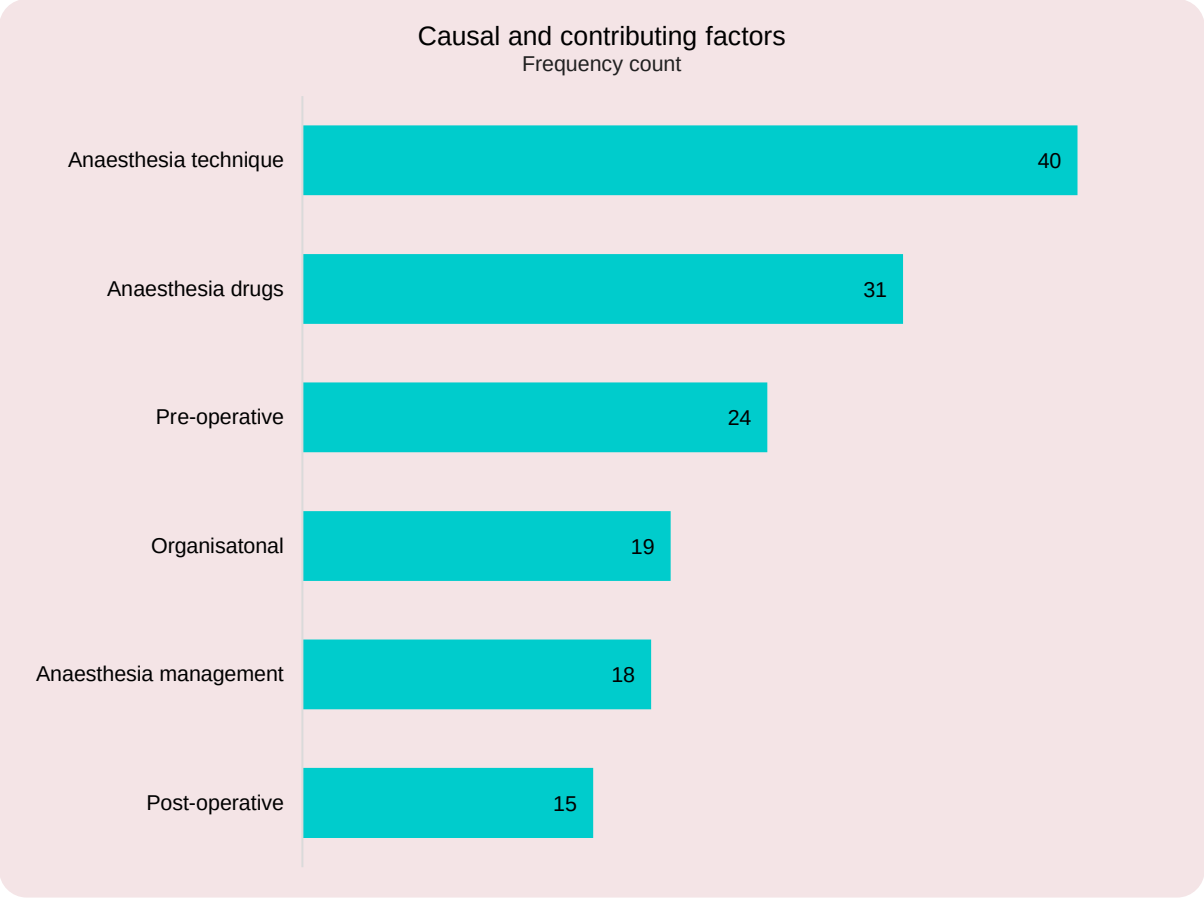
Analysing the data for the five-year period where anaesthesia-related deaths were determined to have a causal factor classification of Ciii (adverse reaction to anaesthesia drugs) identified 9 such deaths (6 male and 3 female), none of which were trauma-related.

5.6 Deaths Attributable to Anaesthesia

5.6.1 Correctable factors

Data analysis over the five-year reporting period on causal and contributing factors recognised in anaesthesia-related deaths, where the Committee determined there was a correctable factor, identified 70 (29%) such deaths, with airway maintenance (n=25) and pre-operative assessment (n=21) the most selected causal or contributory factor.





Figures 17 and 18: Causal and contributing factors (n=143) identified in anaesthesia-related deaths (n=241) with correctable factors (n=70) over the five-year period (2015-2019)

5.6.2 Gender distribution

Data analysis shows a total of 241 anaesthesia-related deaths occurred over the five-year period (2015-2019) with 12.4% (n=30) deaths assessed by the Committee as Category 1; 8.3% (n=20) deaths assessed as Category 2, and; 79.3% (n=191) deaths assessed as Category 3 – *where death was caused by both surgical and anaesthesia factors.*

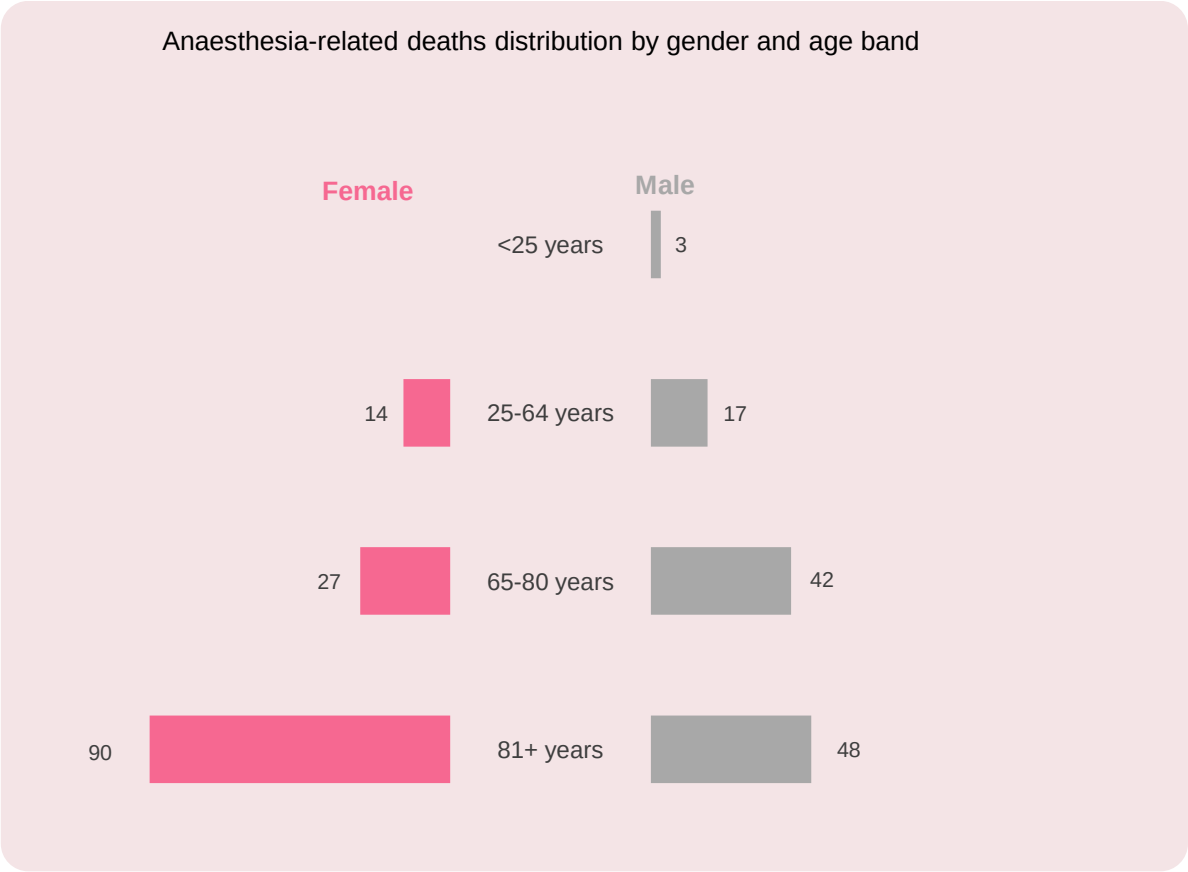
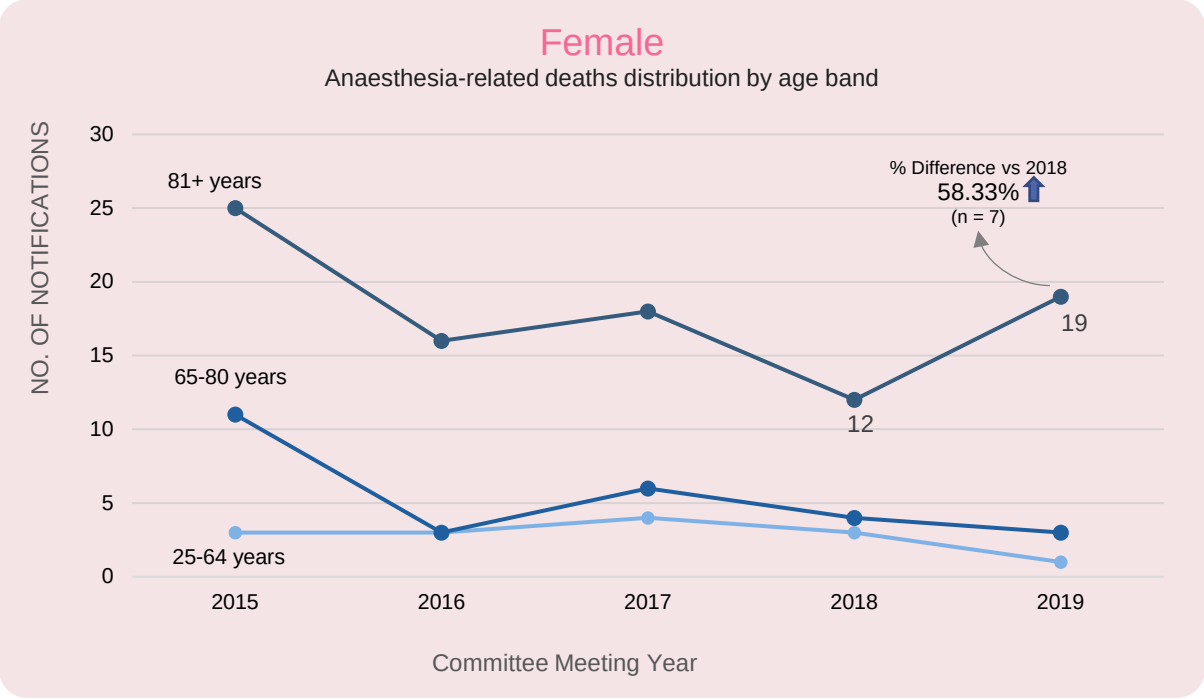


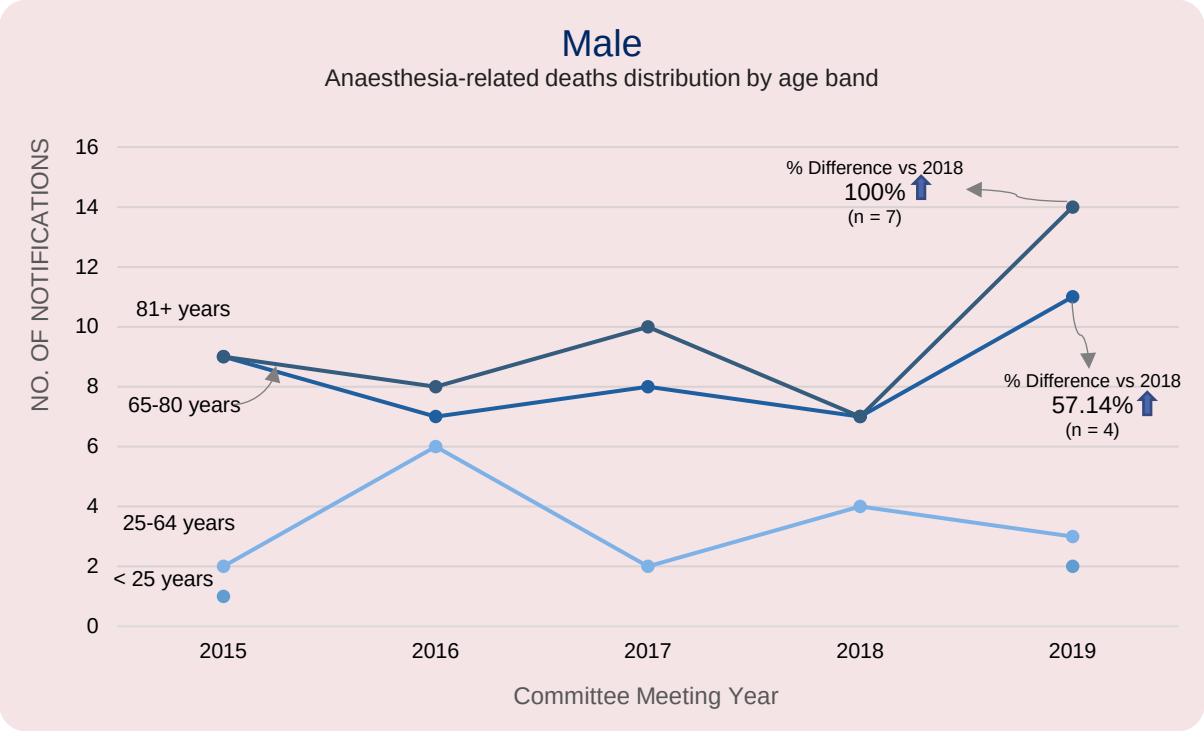
Figure 19: Distribution of anaesthesia-related deaths by gender and age band over the five-year period (2015-2019).

5.6.3 Gender comparison by age group

This data represents those deaths (n=241) over five years by age group and gender. Data analysis shows that 54% (n=131) of deaths were female, with the highest number of anaesthesia-related deaths occurring in 2015 (n=60), of which 65% were female.

There were no female deaths notified for the age group under 25 years, and three male deaths notified for this age group. The age group with the highest number of deaths is 81 years and over (n=138), with 65% being female.





Figures 20 and 21: Comparison of gender and age distribution for deaths attributable to anaesthesia over the five-year period 2015-2019

6. Appendices

6.1 Appendix A – Statistical calculations and procedure codes

ICD10-AM codes to define anaesthesia-related procedures for the SCIDUA 2019 Report	
Clinical Code	**Description**
92500-00	Routine preoperative anaesthesia assessment
92500-01	Prolonged preoperative anaesthesia assessment
92500-02	Emergency preoperative anaesthesia assessment
92514-10	General anaesthesia, ASA 10
92514-19	General anaesthesia, ASA 19
92514-20	General anaesthesia, ASA 20
92514-29	General anaesthesia, ASA 29
92514-30	General anaesthesia, ASA 30
92514-39	General anaesthesia, ASA 39
92514-40	General anaesthesia, ASA 40
92514-49	General anaesthesia, ASA 49
92514-50	General anaesthesia, ASA 50
92514-59	General anaesthesia, ASA 59
92514-69	General anaesthesia, ASA 69
92514-90	General anaesthesia, ASA 90
92514-99	General anaesthesia, ASA 99
92519-10	Intravenous regional anaesthesia, ASA 10
92519-19	Intravenous regional anaesthesia, ASA 19
92519-20	Intravenous regional anaesthesia, ASA 20
92519-29	Intravenous regional anaesthesia, ASA 29
92519-30	Intravenous regional anaesthesia, ASA 30
92519-39	Intravenous regional anaesthesia, ASA 39
92519-40	Intravenous regional anaesthesia, ASA 40
92519-49	Intravenous regional anaesthesia, ASA 49
92519-50	Intravenous regional anaesthesia, ASA 50
92519-59	Intravenous regional anaesthesia, ASA 59
92519-69	Intravenous regional anaesthesia, ASA 69
92519-90	Intravenous regional anaesthesia, ASA 90
92519-99	Intravenous regional anaesthesia, ASA 99

Note: The ICD-10-AM procedure codes used to produce tables 1.1 and 1.2 (below) are shown in the table above. The block numbers 1909, 1910, 1333 and 1912 were used to extract the anaesthesia related episodes.

Table 1.1: Anaesthesia related procedures by type of hospital by year - NSW residents treated interstate are excluded.				
Calendar year	**Type of hospitals**	**Anaesthesia related procedures**		
		No	**Yes**	**All**
2015	public hospital	1,392,702	489,272	1,881,974
	private hospital	563,889	685,954	1,249,843
2016	public hospital	1,448,763	503,874	1,952,637
	private hospital	590,437	701,626	1,292,063
2017	public hospital	1,469,239	508,668	1,977,907
	private hospital	615,920	713,542	1,329,462
2018	public hospital	1,414,362	522,414	1,936,776
	private hospital	652,832	729,980	1,382,812
2019	public hospital	1,426,143	525,844	1,951,987
	private hospital	650,062	739,736	1,389,798
All		**10,224,349**	**6,120,910**	**16,345,259**

Source: Admitted Patient Data Collection in HoPeD1 (linked data) on SAPHaRI, Centre for Epidemiology and Evidence, NSW MOH. Data downloaded 21-Jul-2021.

Table 1.2: Anaesthesia related procedures by type of hospital by year - NSW residents treated interstate are included.				
Calendar year	**Type of hospitals**	**Anaesthesia related procedures**		
		No	**Yes**	**All**
2015	Public hospital	1,428,575	507,265	1,935,840
	Private hospital	560,576	686,872	1,247,448
2016	Public hospital	1,490,575	525,925	2,016,500
	Private hospital	585,294	701,801	1,287,095
2017	Public hospital	1,514,146	536,608	2,050,754
	Private hospital	606,082	713,534	1,319,616
2018	Public hospital	1,472,952	548,562	2,021,514
	Private hospital	640,108	729,453	1,369,561
2019	Public hospital	1,507,985	555,821	2,063,806
	Private hospital	637,001	739,067	1,376,068
All		**10,443,294**	**6,244,908**	**6,688,202**

Source: Admitted Patient Data Collection in CAPED1 folder (unlinked data) on SAPHaRI, Centre for Epidemiology and Evidence, NSW MOH. Data downloaded 21-Jul-2021.

6.2 Appendix B – SCIDUA Form of Notification

NSW GOVERNMENT 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

Holes Punched as per AS2828.1: 2012
BINDING MARGIN - NO WRITING

REPORT OF DEATH ASSOCIATED WITH ANAESTHESIA/SEDATION

SMR010.511

NH0016BA 270320

6.3 Appendix C – SCIDUA Questionnaire

The SCIDUA was amended in June 2021 to align with the report of death. It will now contain pre-populated information from the report of death to assist with its completion.

SPECIAL COMMITTEE INVESTIGATING DEATHS UNDER ANAESTHESIA

PRIVATE & CONFIDENTIAL REPORT

This document is designed for the purposes of SCIDUA and the information collected is protected by privilege 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, such as SCIDUA, qualifies for two (2) credit points with the ANZCA Continuing Professional Development program.

PLEASE RETURN THIS FORM TO:
CEC-SCIDUA@health.nsw.gov.au

Case Number *(office use only)* «caseID»	**Hospital & Location** *(eg. ICU; Theatre; Recovery; Ward)* «FacName», «Location»		**Date & Time of Death** «deathDate» at «DeathTime»
Name of Patient «firstName» «lastName»	**Age** «age»	**Sex** «Gender»	**Weight** «weight» kg
Name of Anaesthetist/Sedationist Dr «An1Firstname» «An1LastName»	**Qualifications** «Anaesthetist2_Quals»	**Appointment** «Anaesthetist1_Position»	

Name and appointment of other Anaesthetists present	«AnaesthetistId2» «Anaesthetist2_Quals», «Anaesthetist2_Position»
Pre-operative diagnosis/condition	«PreOpDiagnosisCondition»
Operation(s) / procedure(s)	«SurgeryOpProcedureDone»
Findings at operation/procedure	«SurgeryFindingAtOpProcedure»
Pre-anaesthetic assessment, including:	
1. Relevant history 2. Clinical findings 3. Relevant investigations	
Pre-anaesthetic preparation, including:	
1. Blood or fluids given pre-operatively and over what period 2. Pre-medication if any 3. Any other measures	
Likely cause of death	«QuestionLikelyCauseDeath»
Opinion on the cause of death (if different from above)	

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 • t wave inversion • 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

[Please use as much space for this section as you feel necessary]

TIME	DATE

If not already provided, please attach copies of Anaesthetic and Recovery room charts/records

6.4 Appendix D – 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.

6.5 Appendix E – ASA Physical Status Classification System

Approved examples for adults, paediatric and obstetric patients were provided in the amendment of December 2020 for the ASA classification system.

American Society of Anesthesiologists®

ASA Physical Status Classification System

Committee of Oversight: Economics

(Approved by the ASA House of Delegates on October 15, 2014, and last amended on December 13, 2020)

The ASA Physical Status Classification System has been in use for over 60 years. The purpose of the system is to assess and communicate a patient's pre-anesthesia medical co-morbidities. The classification system alone does not predict the perioperative risks, but used with other factors (eg, type of surgery, frailty, level of deconditioning), it can be helpful in predicting perioperative risks.

The definitions and examples shown in the table below are guidelines for the clinician. To improve communication and assessments at a specific institution, anesthesiology departments may choose to develop institutional-specific examples to supplement the ASA-approved examples.

Assigning a Physical Status classification level is a clinical decision based on multiple factors. While the Physical Status classification may initially be determined at various times during the preoperative assessment of the patient, the final assignment of Physical Status classification is made on the day of anesthesia care by the anesthesiologist after evaluating the patient.

Current Definitions and ASA-Approved Examples

ASA PS Classification	Definition	Adult Examples, Including, but not Limited to:	Pediatric Examples, Including but not Limited to:	Obstetric Examples, Including but not Limited to:
ASA I	A normal healthy patient	Healthy, non-smoking, no or minimal alcohol use	Healthy (no acute or chronic disease), normal BMI percentile for age	
ASA II	A patient with mild systemic disease	Mild diseases only without substantive functional limitations. Current smoker, social alcohol drinker, pregnancy, obesity (30<BMI<40), well-controlled DM/HTN, mild lung disease	Asymptomatic congenital cardiac disease, well controlled dysrhythmias, asthma without exacerbation, well controlled epilepsy, non-insulin dependent diabetes mellitus, abnormal BMI percentile for age,	Normal pregnancy*, well controlled gestational HTN, controlled preeclampsia without severe features, diet-controlled gestational DM.

1

			mild/moderate OSA, oncologic state in remission, autism with mild limitations	
ASA III	A patient with severe systemic disease	Substantive functional limitations; One or more moderate to severe diseases. Poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, history (>3 months) of MI, CVA, TIA, or CAD/stents.	Uncorrected stable congenital cardiac abnormality, asthma with exacerbation, poorly controlled epilepsy, insulin dependent diabetes mellitus, morbid obesity, malnutrition, severe OSA, oncologic state, renal failure, muscular dystrophy, cystic fibrosis, history of organ transplantation, brain/spinal cord malformation, symptomatic hydrocephalus, premature infant PCA <60 weeks, autism with severe limitations, metabolic disease, difficult airway, long term parenteral nutrition. Full term infants <6 weeks of age.	Preeclampsia with severe features, gestational DM with complications or high insulin requirements, a thrombophilic disease requiring anticoagulation.
ASA IV	A patient with severe systemic disease	Recent (<3 months) MI, CVA, TIA or CAD/stents, ongoing cardiac ischemia or severe	Symptomatic congenital cardiac abnormality, congestive heart	Preeclampsia with severe features complicated by HELLP or other adverse event, peripartum cardiomyopathy with EF

	that is a constant threat to life	valve dysfunction, severe reduction of ejection fraction, shock, sepsis, DIC, ARD or ESRD not undergoing regularly scheduled dialysis	failure, active sequelae of prematurity, acute hypoxic-ischemic encephalopathy, shock, sepsis, disseminated intravascular coagulation, automatic implantable cardioverter-defibrillator, ventilator dependence, endocrinopathy, severe trauma, severe respiratory distress, advanced oncologic state.	<40, uncorrected/decompensated heart disease, acquired or congenital.
ASA V	A moribund patient who is not expected to survive without the operation	Ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction	Massive trauma, intracranial hemorrhage with mass effect, patient requiring ECMO, respiratory failure or arrest, malignant hypertension, decompensated congestive heart failure, hepatic encephalopathy, ischemic bowel or multiple organ/ system dysfunction.	Uterine rupture.
ASA VI	Patient declared brain- dead whose organs are for donor purposes			

American Society of
Anesthesiologists

** Although pregnancy is not a disease, the parturient' s physiologic state is significantly altered from when the woman is not pregnant, hence the assignment of ASA 2 for a woman with uncomplicated pregnancy.*
***The addition of "E" denotes Emergency surgery: (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)*

References

For more information on the ASA Physical Status Classification system and the use of examples, the following publications are helpful. Additionally, in the reference section of each of the articles, one can find additional publications on this topic.

1. Abouleish AE, Leib ML, Cohen NH. ASA provides examples to each ASA physical status class. *ASA Monitor* 2015; 79:38-9 http://monitor.pubs.asahq.org/article.aspx?articleid=2434536

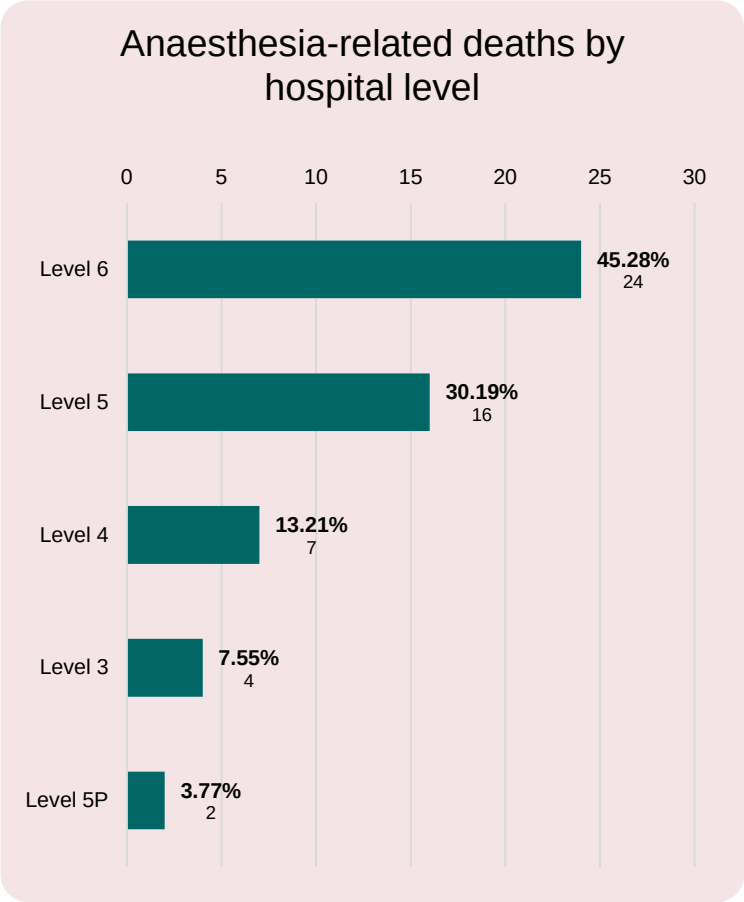
2. Hurwitz EE, Simon M, Vinta SR, et al. Adding examples to the ASA-Physical Status classification improves correct assignments to patients. *Anesthesiology* 2017; 126:614-22

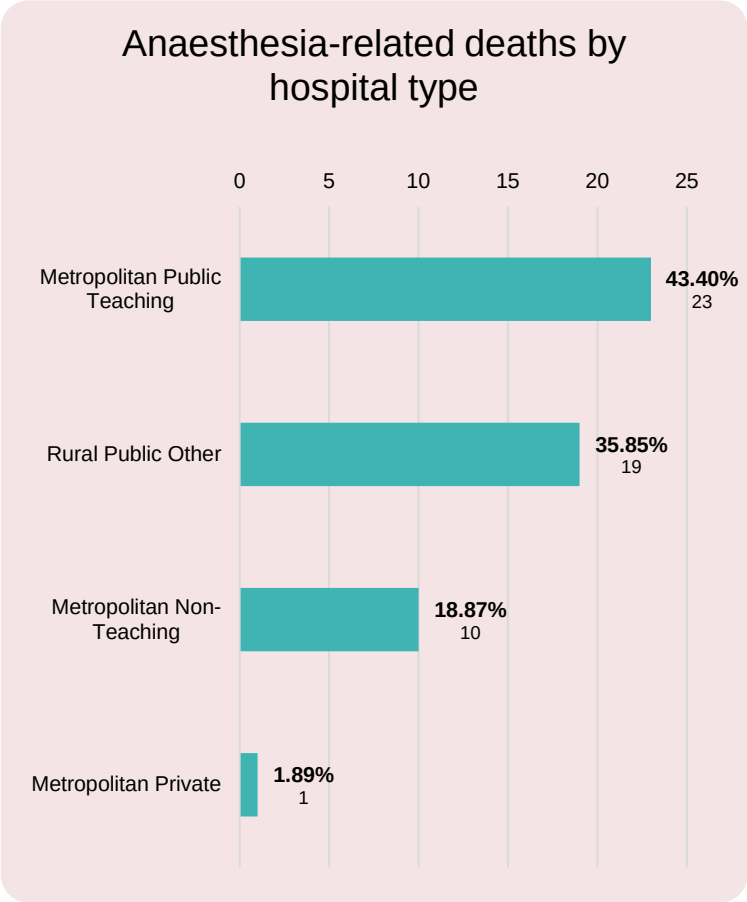
3. Mayhew D, Mendonca V, Murthy BVS. A review of ASA physical status – historical perspectives and modern developments. Anaesthesia 2019; 74:373-9

4. Leahy I, Berry JG, Johnson C, Crofton C, Staffa S, Ferrari LR. Does the Current ASA Physical Status Classification Represent the Chronic Disease Burden in Children Undergoing General Anesthesia? Anesthesia & Analgesia, October 2019;129(4):1175-1180

5. Ferrari L, Leahy I, Staffa S, Johnson C, Crofton C, Methot C, Berry J. One Size Does Not Fit All: A Perspective on the American Society of Anesthesiologists Physical Status Classification for Pediatric Patients. Anesthesia & Analgesia, June 2020;130(6):1685-1692
6. Ferrari LR, Leahy I, Staffa SJ, Berry JG. The Pediatric Specific American Society of Anesthesiologists Physical Status Score: A Multi-center Study. Anesthesia & Analgesia 2020 (in press)

6.6 Appendix F – Additional Data Analysis





Figures 6.1 and 6.2: Distribution of anaesthesia-related deaths by hospital level and hospital type for 2019 (n=53).

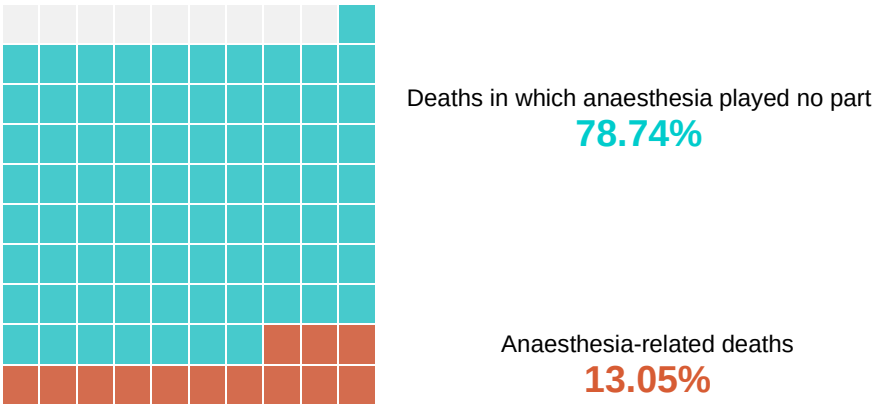


Figure 8.1: Waffle chart comparing the percentage of deaths (n=1,693) over a five-year period (2015-2019) notified to SCIDUA where (a) anaesthesia played no part in the death (b) it was an anaesthesia-related death, and (c) the form was incomplete or excluded.

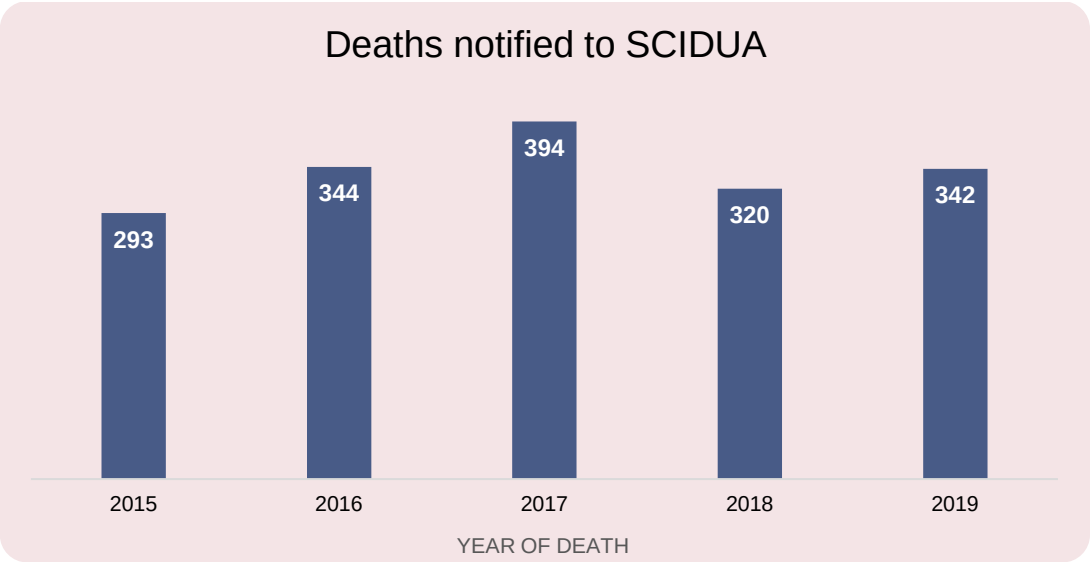


Figure 8.2: Deaths (n=1,693) notified to SCIDUA occurring by date of death year

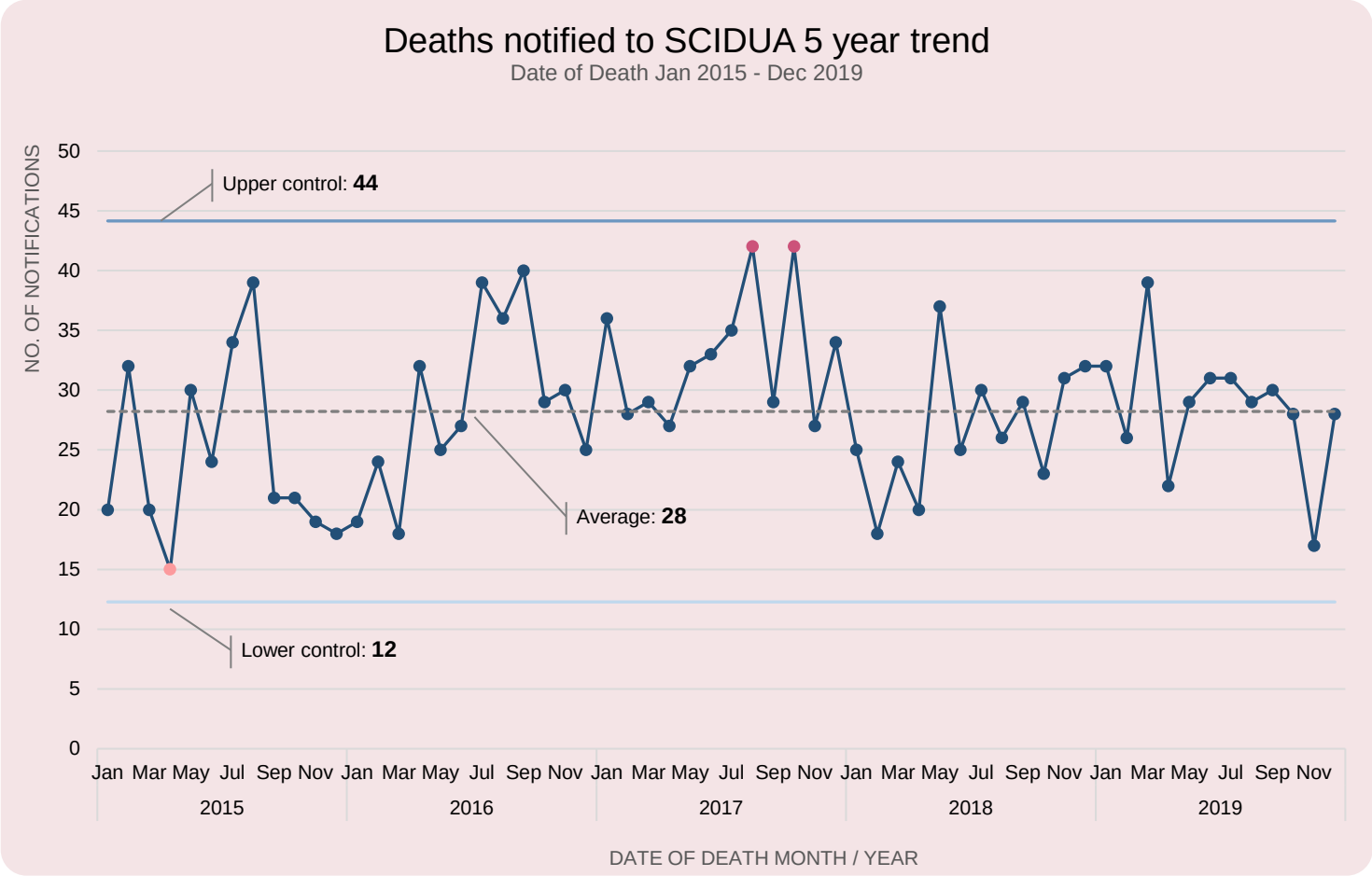


Figure 8.3: Deaths (n=1,693) notified to SCIDUA occurring by date of death month and year

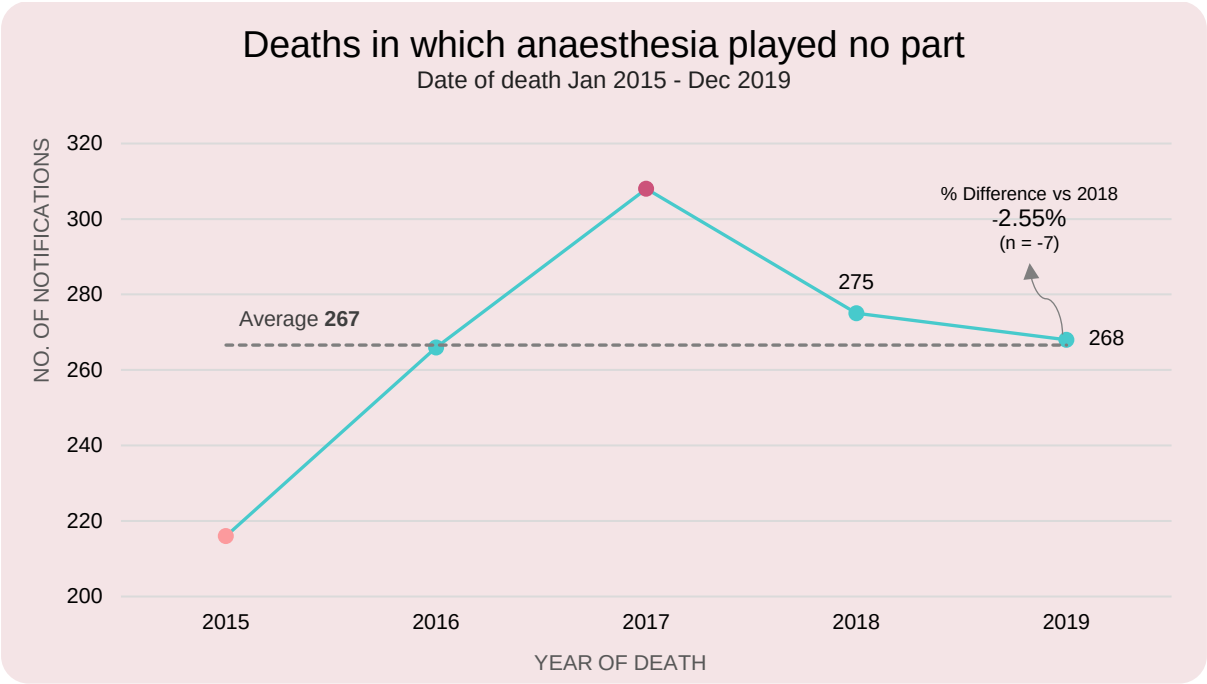


Figure 8.4: Deaths in which anaesthesia played no part by date of death year

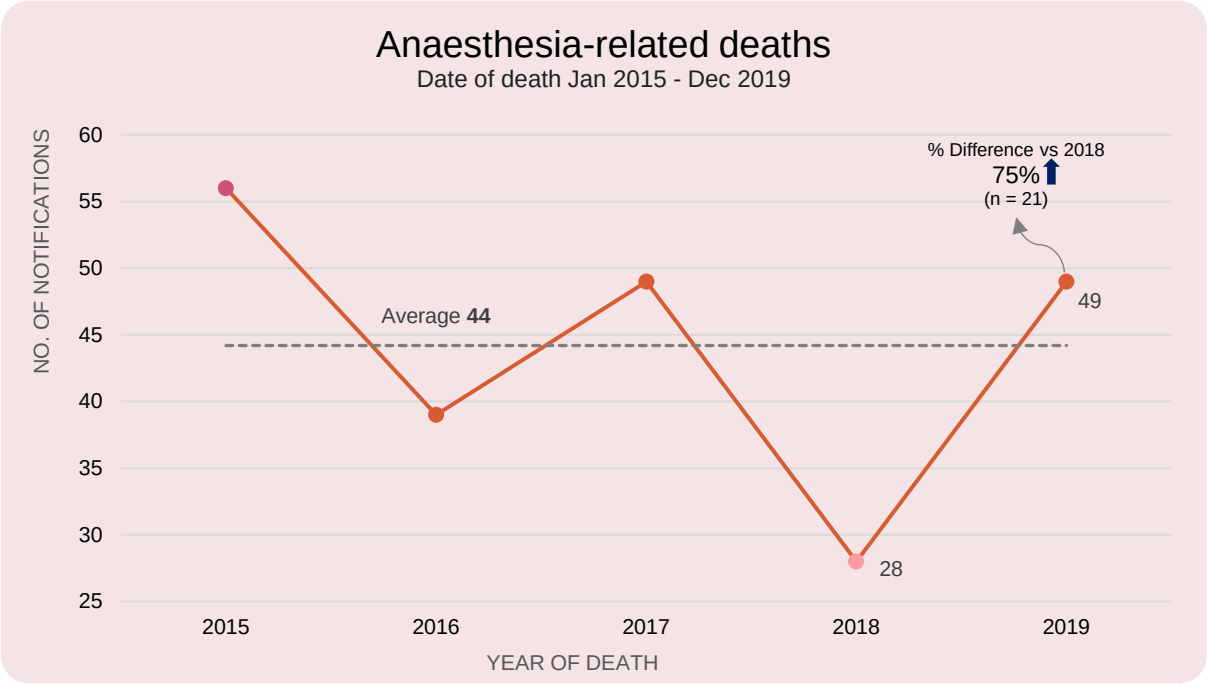
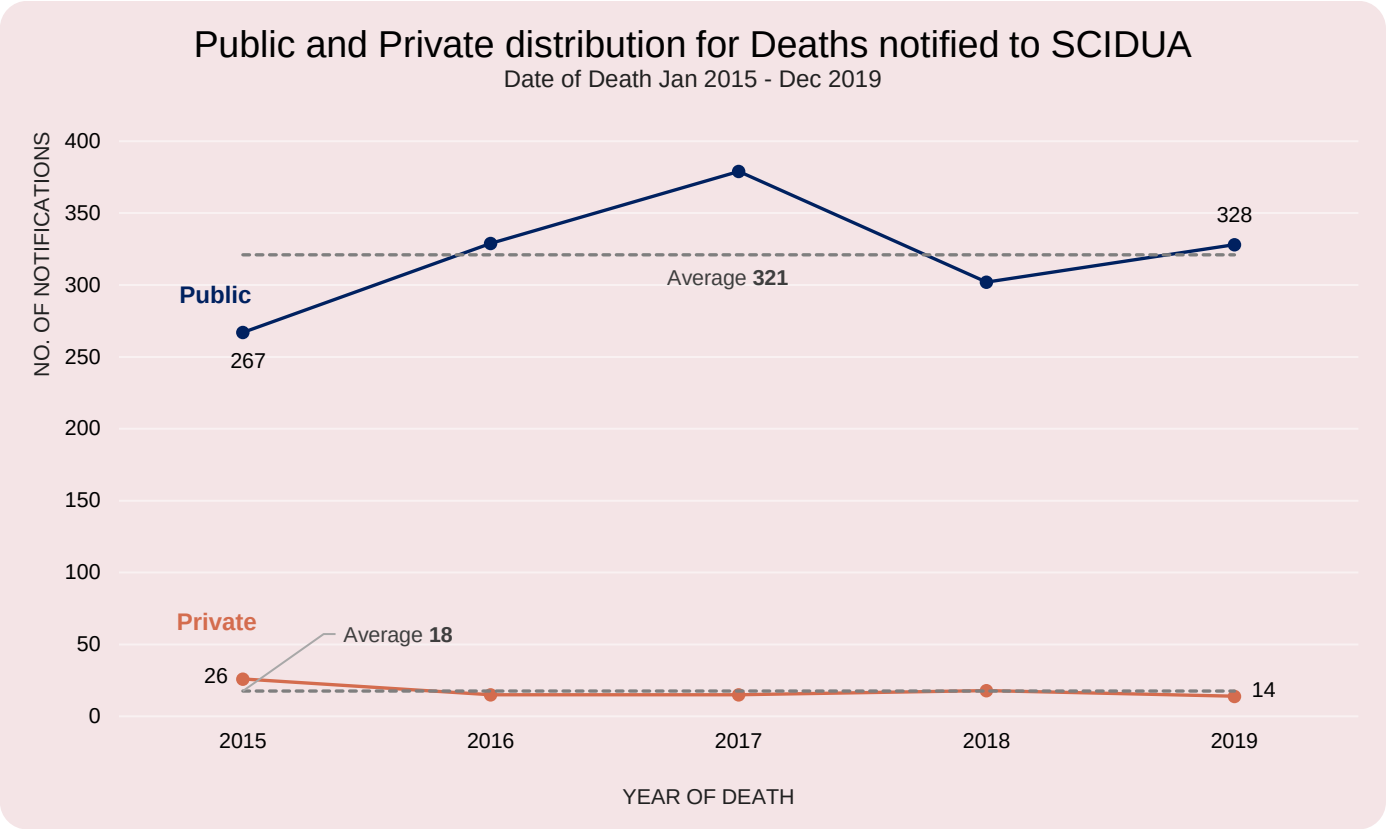
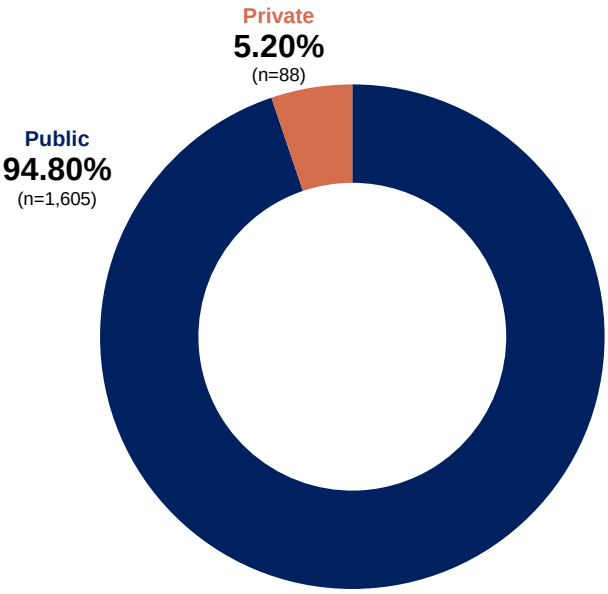


Figure 8.5: Anaesthesia-related deaths by date of death year

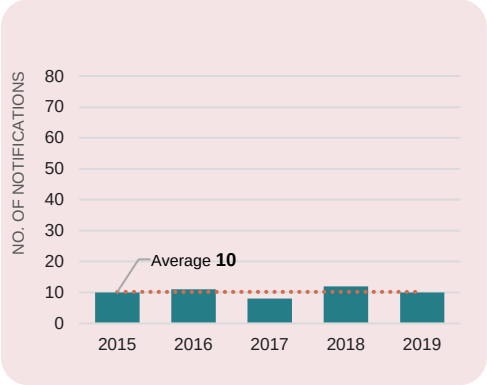




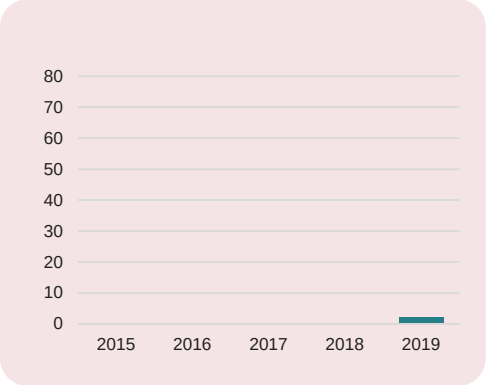
Figures 9.1 and 9.2: Distribution of Private and Public notifications of death overall and by year

Notification of death by Hospital Groups

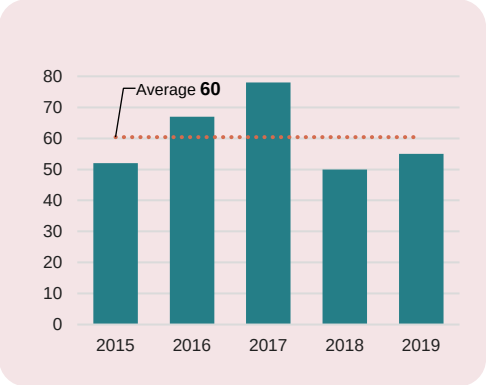
CCLHD
Total Notifications 51



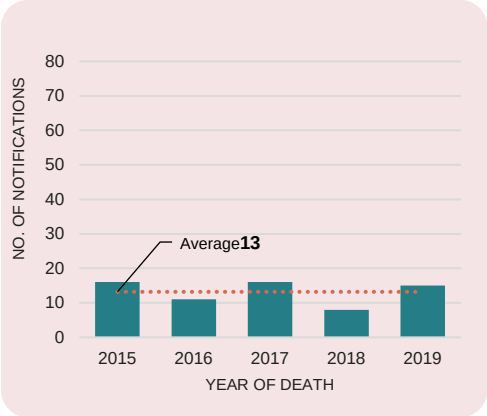
FWLHD
Total Notifications 2



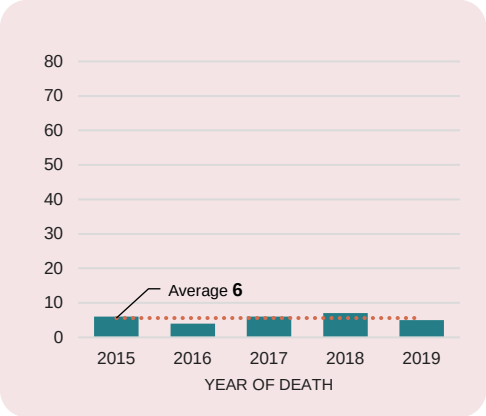
HNELHD
Total Notifications 302



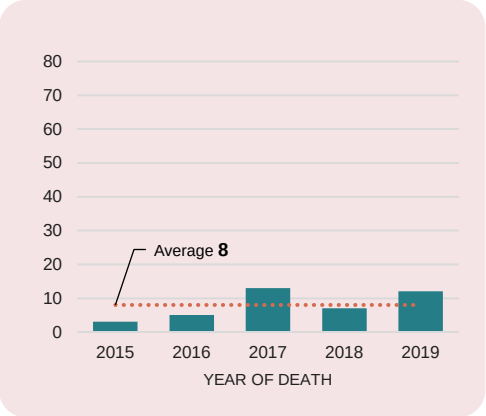
ISLHD
Total Notifications 66



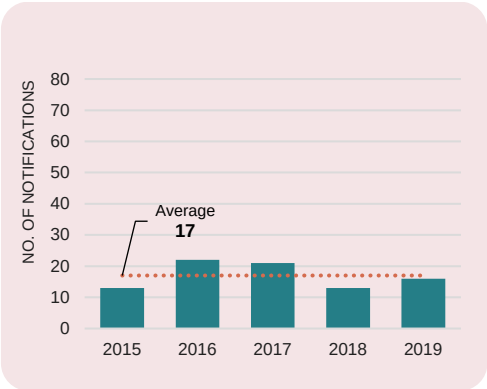
MLHD
Total Notifications 28



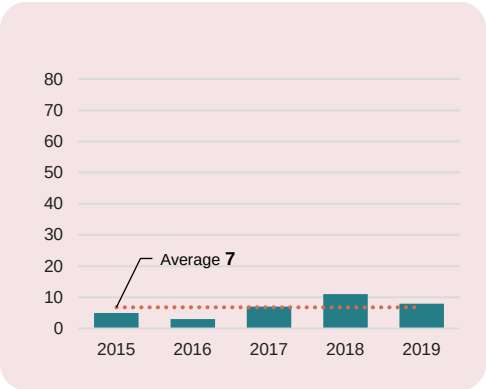
MNCLHD
Total Notifications 40



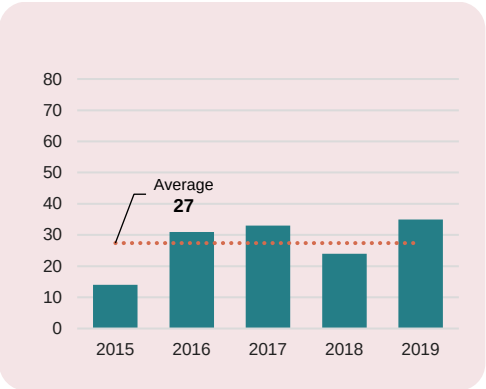
NBMLHD
Total Notifications 85



NNSWLHD
Total Notifications 34



NSLHD
Total Notifications 137



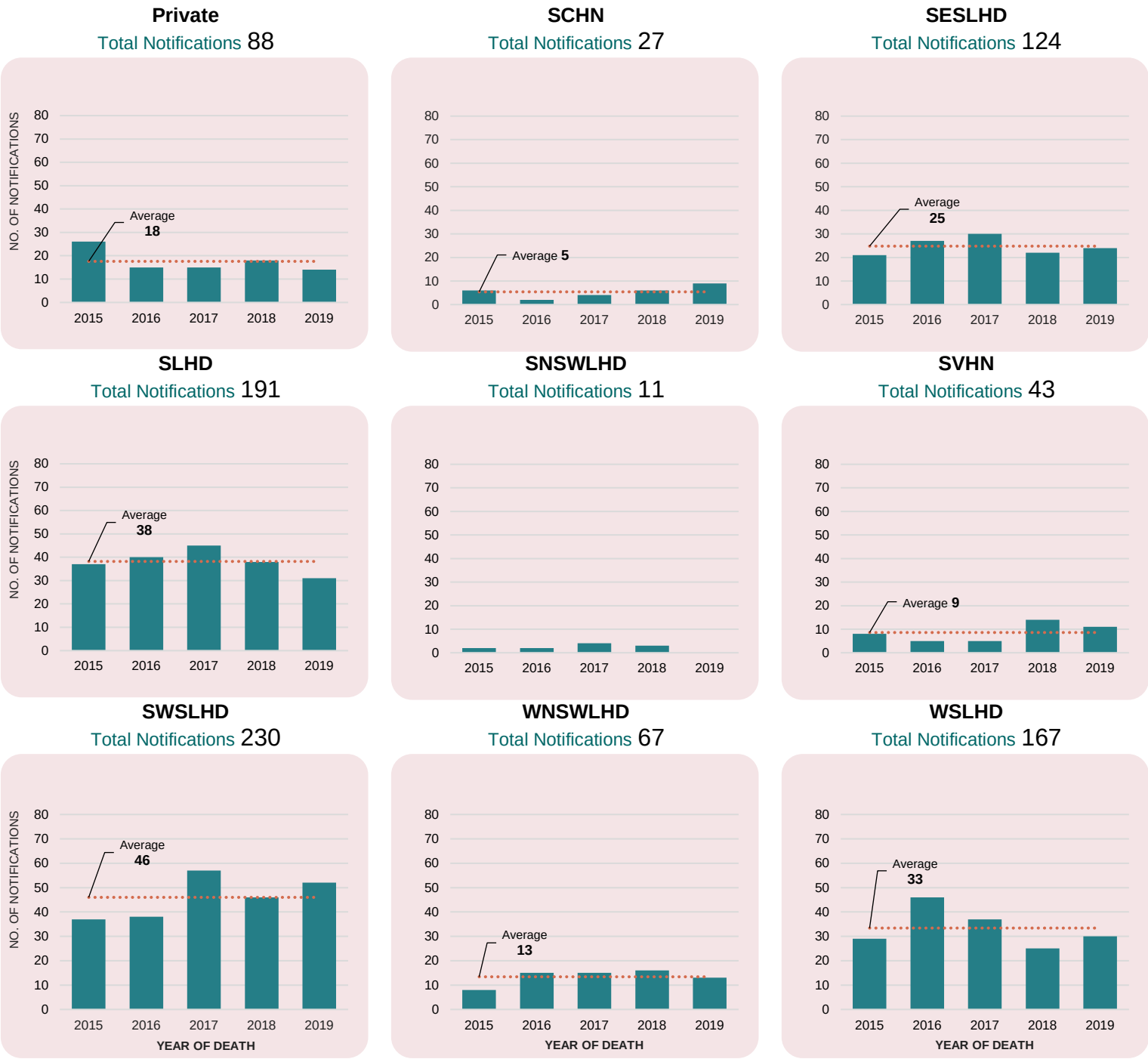


Figure 14.1: Distribution of deaths (n=1,693) notified to SCIDUA by calendar year for hospital groups over a five-year period (2015-2019).

7. Tables

8. Images

9. Figures

Appendix F Figures

Figures 6.1 and 6.2: Distribution of anaesthesia-related deaths by hospital level and hospital type for 2019 (n=53).

Figure 8.1: Waffle chart comparing the percentage of deaths (n=1,693) over a five-year period (2015-2019) notified to SCIDUA where (a) anaesthesia played no part in the death (b) it was an anaesthesia-related death, and (c) the form was incomplete or excluded.

Figure 8.2: Deaths (n=1,693) notified to SCIDUA occurring by date of death year

Figure 8.3: Deaths (n=1,693) notified to SCIDUA occurring by date of death month and year

Figure 8.4: Deaths in which anaesthesia played no part by date of death year

Figure 8.5: Anaesthesia-related deaths by date of death year

Figures 9.1 and 9.2: Distribution of Private and Public notifications of death overall and by year

Figure 14.1: Distribution of deaths (n=1,693) notified to SCIDUA by calendar year for hospital groups over a five-year period (2015-2019).