CHASM

COLLABORATING HOSPITALS' AUDIT OF SURGICAL MORTALITY

2020 ANNUAL REPORT

DISCLAIMER

All identifying information has been omitted to preserve anonymity.

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CHASM would like to acknowledge and thank the following surgeons for their artistic submissions:

- **Report Cover** - *Corlette Beach, Port Stephens*: Dr Farid Meybodi, MD MS FRACS, Oncoplastic Breast and Endocrine Surgeon.
- **Section Header, Lessons Learnt** – *Sunrise over Lake Wakatipu*, Queenstown, New Zealand: Dr Johan le Roux, MBChB, MMed Ortho(SA), FC Ortho(SA), FRACS, Orthopaedic Surgeon.
- **Section Header, Data Analytics** – *Stormy skies over Shellharbour Rockpool in Winter*: Dr Allen James, MBBS, FRACS, Cardiothoracic Surgeon.

NSW GOVERNMENT | CLINICAL EXCELLENCE COMMISSION

Table of Contents

CHAIRMAN'S FOREWORD

Surgery in New South Wales is incredibly safe despite the constantly changing environment. We are now operating on patients who were previously over the threshold for safe surgery with new procedures and using new technologies, such as robotics.

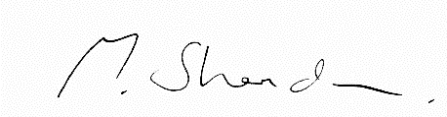
However, the constant aim is to keep our patients safe and to send them home with a good surgical outcome. Unfortunately, this is not always possible, particularly as we have more elderly patients with multiple medical problems becoming complex surgical candidates.

The Collaborating Hospitals Audit of Surgical Mortality (CHASM) reviews deaths within 30 days of surgery with the majority of deaths being elderly patients who are urgently admitted for care. Despite our best efforts, untoward events can occur, like unexpected complications where the patient is unable to recover.

It is important that surgeons are afforded the time to discuss the case examples in this report so that future events may be avoided. Analysing the lessons learnt and sharing different perspectives brings diversity and inclusion into the operating theatre.

Many of the take home messages from these case examples are similar to previous years – delay to diagnosis, delay to transfer and delay to surgery, but also how issues such as infection, ischaemia and sepsis complicate the expected recovery of surgical patients. Being aware of these factors, considering the potential complications or challenges which may be possible during a patient's surgical admission, and ensuring clear communication amongst all persons involved in clinical management is essential to ensure *patients and carers have positive experiences and outcomes that matter.*[1]

I would like to thank the surgeons of New South Wales who have participated in CHASM as a participant - sharing their operative experiences – or as a first, or second, line assessor providing their perspective and expertise. CHASM provides this insightful educational report for guidance to surgeons in challenging situations, as well as all health facilities across the state to provide opportunities for improvement.



Associate Professor Mark Sheridan
Neurosurgeon and CHASM Chairman

[1] Future Health: Strategic Framework - Summary https://www.health.nsw.gov.au/about/nswhealth/Pages/future-health.aspx

EXECUTIVE SUMMARY

The Collaborating Hospitals' Audit of Surgical Mortality (CHASM) in New South Wales is a state-wide program which aims to improve surgical care in public and private hospitals through reflection and peer review. The program is overseen by its Ministerial Committee, with members appointed by the Secretary, NSW Health, under delegation by the Minister for Health, and is administered by the Clinical Excellence Commission. The Royal Australasian College of Surgeons (RACS) supports CHASM activities with the allocation of CPD points for each level of activity – Participant; First Line Assessor; Second Line Assessor.

The CHASM's purpose is to review deaths that occur within 30 days after an operation or procedure, or during the last hospital admissions under the care of a surgeon, irrespective of whether an operation has been performed or not. Special privilege is provided for the information collected by CHASM under section 23 of the *Health Administration Act 1982*.

NSW Health has been conducting investigations into deaths associated with surgery since 1994 for the purpose of educating surgeons and health care providers. This voluntary activity transitioned to the current structure in 2007, promoting the collaborative nature of the audit to elicit greater participation from hospitals and surgeons. By the end of June 2009, 563 (39.8%) surgeons were participating in CHASM, with 261 First Line Assessors and 185 Second Line Assessors.

Today, CHASM has 1,596 participating consultants, 476 First Line Assessors and 348 Second Line Assessors. There are also 15 Local Health Districts, 2 Specialty Health Networks and 50 private hospitals providing notifications of death and medical records to CHASM to facilitate the peer review process. This collaborative effort has resulted in an average of 2,136 notification per annum (2014-2020) to CHASM.

This report reviews trend data for 6 years (2015-2020) and data relating to activity and deaths in 2020.

For 2020:

- Hospitals notified CHASM within 90 days of death in 53.1% (1,054) of cases.
- The average response rate for surgeons submitting of case forms for 2020 deaths was 82.66%.
- Surgeons completed 1,406 first line assessments (of which 221 had clinical management issues).
- Surgeons completed 125 second line assessments in 2020 (43 of which were 2020 deaths).
- The highest number of admissions was for (1) fractured neck of femur and (2) intestinal obstruction.
- The most frequent causes of death were (1) multiple organ failure and (2) septicaemia.

For deaths in 2015 – 2020:

- Analysis showed consistent trends across the years for clinical management issues with the 'Top 4' concerns identified as: Incorrect/Inappropriate therapy; Delays; Assessment problems, and; Communication failures
    - 5.64% (n=558) of responses indicated a *delay in confirmation of main surgical diagnosis*.
- There were 22.14% (n=2,187) of patients transferred pre-operatively.
    - 10.24% (n=224) experienced a delay in transfer.
- A definable post-operative complication was identified in 23.34% (n=2,308) of submitted forms.
    - 124 confirmed *delay in recognising a post-operative complication*.
- A total of 2,214 (17.19%) of deaths were classified as terminal care; an average of 369 per annum.

End-of-life care concerns continue to be a theme in some of the case histories. End-of-life is a vulnerable time and surgery is sometimes offered for comfort measures. However, there is always a risk associated with any surgical intervention and anaesthesia, and at times higher level surgical interventions may result in hastened demise or poor outcomes. Communication between the patient, families and surgeons is always paramount when planning end-of-life care, with risks and benefits discussed to ensure everyone has a clear understanding of ceilings of care beforehand. These case studies demonstrate that this is not an easy conversation to have, and it is hoped that surgeons will benefit from these shared experiences.

CHASM COMMITTEE

The Collaborating Hospitals' Audit of Surgical Mortality (CHASM) in New South Wales is a state-wide program which aims to improve surgical care in public and private hospitals through reflection and peer review. The program is overseen by its Ministerial Committee, with members appointed by the Secretary, NSW Health, under delegation by the Minister for Health, and is administrated by the Clinical Excellence Commission.

The Committee meets approximately every two months, usually on a Monday evening, to review the CHASM cases which were referred for Second Line Assessment to discuss the feedback. If any areas of consideration or concern were identified by the Assessor, the Committee deliberates on how to address these issues from a quality improvement and patient safety perspective.

The CHASM Chairman also participates in the Australian and New Zealand Audit of Surgical Mortality (ANZASM) Steering Committee and the National Clinical Directors' meetings facilitated by the Royal Australasian College of Surgeons (RACS).

COMMITTEE MEMBERS

Current membership (L-R): Mark Sheridan (Chairman), Rob Costa, Andrew Armstrong, Julie Howle, Ruth Collins, (Anthony) Drew Dixon, Brett Courtenay, John Fox, Saissan Rajendran, Zsolt Balogh, Michelle Atkinson, (Upeksha) Pecky De Silva, (Katherine) Kate Gibson and Christina Norris.

OUTGOING COMMITTEE MEMBERS

The CHASM Chairman and the Clinical Excellence Commission would like to thank these former CHASM committee members for their service:

David Blomberg, Ming Loh, Shehnarz Salindera, Mark Wiggins, Susan Valmadre, Melinda van Oosterum, Carrie Marr and Payal Mukherjee.

Your time and commitment to this valuable peer review program is greatly appreciated.

CLINICAL EXCELLENCE COMMISSION

Adjunct Professor Michael C. Nicholl
Chief Executive, CEC
MBBS MBA(PubSecMgt) PhD FRANZCOG FRCOG AFCHSM FAAQHC

As a clinician of 40 years, a specialist obstetrician and gynaecologist for 30 years, a senior clinician manager for 15 years, and as the senior clinical advisor obstetrics to NSW Health for over a decade, Michael has been a visionary and inspirational leader who has led and promoted excellence in safety and quality in clinical care primarily across maternity, newborn and women's health.

Dr James Mackie
Medical Director Patient Safety, CEC
MB BS FRACP

Jim is a renal physician who has worked over many years in a number of LHDs as a clinician/manager. He is passionate about patient safety and quality improvement and strongly advocates for robust data and reliable systems to enhance the patient experience. His role includes leading the Data and Analytics Team which provides the Death Review Database. Jim works closely with eHealth on all aspects of patient safety in the electronic domain.

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CHASM OVERVIEW

CHASM was established for registered surgeons practicing in public and private hospitals across New South Wales. It is not the intention of the program to be performance driven, but rather, to inform and initiate conversations that drive improvement. This is done through the confidential feedback provided to operating surgeons and peer review assessors, as well as through the program's shared clinical lessons.

It provides a safe environment in which to enable peer review of patient care and promote further reflection on the techniques used, the decisions made, and the clinical care provided during the patient's last admission. Through the course of the peer review, both the surgeon and the assessor benefit from the process of reflection, with many Second Line Assessors discovering insights when reviewing the medical record or writing their report.

HISTORY

- On 26 May 1994, the then NSW Minister for Health initiated a Special Committee Investigating Deaths Associated With Surgery (SCIDAWS). Its purpose was to collate surgical mortality data submitted voluntarily, for the purpose of educating surgeons and health care providers.
- Following recommendations from the Morey Report, in 2004 SCIDAWS was transferred to the Institute of Clinical Excellence to improve the reporting and investigation of surgical deaths.
- In July 2006 the functions of SCIDAWS were expanded to enable a more systematic and comprehensive audit, including cases where no operation was performed.
- On 7 November 2007 the then Minister for Health approved a name change, and SCIDAWS became CHASM. The focus of the name change was to promote the collaborative nature of the audit and to elicit greater participation from hospitals and surgeons alike.
- The Minister also confirmed in Government Gazette No. 169 that special privilege provided under the *Health Administration Act 1982* for SCIDAWS would continue for CHASM

GOVERNANCE

- The governance framework and operational structure for the CHASM program is administered by the Secretary, NSW Health. The program is overseen by the CHASM Committee, established under section 20(5) of the *Health Administration Act 1982*. The Chairperson and members of the Committee are appointed by the Secretary, NSW Health, as delegated by the Minister for Health.
- Remuneration for the Committee is determined by the Public Service Commission's *Classification and Remuneration Framework for NSW Government Boards and Committees*, guidelines announced in Premier's Memorandum 2012-18.
- The Appointment Standards for NSW Government Boards and Committees are largely principles-based, issued by the Public Service Commissioner, pursuant to section 11(1)(g) of the *Government Sector Employment Act 2013.*
- The Clinical Excellence Commission manages the surgical and anaesthesia mortality audits for New South Wales through the Special Committees Program. Data collection and patient information is provided by public and private hospitals, and registered medical practitioners throughout the state.

TERMS OF REFERENCE

The Terms of Reference[2] for the NSW Collaborating Hospitals' Audit of Surgical Mortality (CHASM) establishes its purpose as follows: *to review deaths that occur within 30 days after an operation or procedure, or during the last hospital admission under the care of a surgeon, irrespective of whether an operation has been performed or not.*

HEALTH ADMINISTRATION ACT 1982

TERMS OF REFERENCE

COLLABORATING HOSPITALS' AUDIT OF SURGICAL MORTALITY

I, ELIZABETH KOFF, Secretary, Ministry of Health, acting as the authorised delegate of the Minister of Health, pursuant to sections 20(5) and 23 of the *Health Administration Act 1982* (the Act) and section 43 of the *Interpretation Act 1987*, do hereby repeal the existing terms of reference for the Collaborating Hospitals' Audit of Surgical Mortality (CHASM), and authorise CHASM to conduct investigations and research in accordance with section 23 of the Act as follows:

1. Governance and statutory privilege

The Collaborating Hospitals' Audit of Surgical Mortality (CHASM) is governed by its Ministerial Committee and administratively supported and managed by the Special Committees Program at the Clinical Excellence Commission.

CHASM is constituted under section 20 of the Act and is afforded privilege under section 23 of the Act for the purpose of conducting research or investigations into morbidity and mortality occurring within NSW. Material created for and by CHASM is privileged and cannot be disclosed or released, otherwise than in accordance with these terms of reference, without the approval of the Minister for Health or the Minister's authorised delegate.

2. Purpose

The purpose of CHASM is to review deaths that occur within 30 days after an operation or procedure, or during the last hospital admission under the care of a surgeon, irrespective of whether an operation has been performed or not.

3. Functions

CHASM will:

- undertake, oversee, and coordinate a systematic audit of surgical mortality in NSW, using peer review processes;
- obtain information including confidential medical information, case notes and opinions relevant to deaths associated with surgical care from: individual surgeons, in relation to cases that have been notified to CHASM; public health organisations, private health facilities and day procedure centres in relation to cases being reviewed by CHASM, and external assessors (including individual surgeons and such other persons or bodies as the Committee considers appropriate) to CHASM to perform its functions;
- review deaths associated with surgical care, identify potentially preventable factors associated with these cases, and provide confidential feedback to the surgeons involved;
- receive notifications of deaths associated with surgical care from individual surgeons, public health organisations, private hospitals and day procedure centres, and the NSW State Coroner;
- contribute surgical expertise to the preparation, analysis and interpretation of publications and reports to highlight any surgical learnings and identify any recommendations for appropriate action;
- conduct relevant research projects using the data and de-identified information obtained as part of the audit;
- share information from the audit findings with the Special Committee Investigating Deaths Under Anaesthesia (SCIDUA) for the following: Notification data on deaths that occur while under, or as a result of, or within 24 hours after, the administration of an anaesthetic or a sedative drug;
- contribute surgical expertise to the review of clinical incidents involving surgical care and make recommendations for system improvement;
- regularly review the Committee's functions and activities including maintenance of security and confidentiality of case data.

Image 1: Page 1 of the CHASM Terms of Reference.

[2] https://www.cec.health.nsw.gov.au/__data/assets/pdf_file/0005/258116/Collaborating-Hospitals-Audit-of-Surgical-Mortality-CHASM-Terms-of-Reference.pdf

COMPLETING A SURGICAL CASE FORM

When an operating surgeon is completing an electronic surgical case form, they should complete all the fields and radio buttons as the platform is designed with a program logic that is generated from the response given for each parent question. When using an electronic platform to collect data and free text from many individual users, it is critical for the data to be of high quality.

Attention should be given when completing Question 9 - *Please describe the course to death.* This response allows the surgeon to share their unique surgical journey and should not be used to "copy and paste" the clinical notes, as this makes for a burdensome review by the independent peer reviewer.

CHASM encourages consultants to complete their own surgical case forms rather than delegating them to junior staff as the surgeon who was present in the operating theatre can provide the best details of the patient's course to death (Question 9). Analysis indicates that a higher proportion of delegated forms receive second line assessment, as the first line assessor questions the details to determine whether there is a genuine concern, consideration or adverse event which may need Second Line Assessment

CHASM encourages surgeons to allocate sufficient time to complete Question 25 - *In retrospect, would you have done anything differently?* This question allows surgeons to reflect on events which occurred *during the course of the patient's admission*, and to share insights that may become apparent in hindsight.

COMPLETING A FIRST LINE ASSESSMENT

CHASM encourages all surgeons to register as a First Line Assessor to conduct peer reviews for their specialty. The review process is simple and requires a short timeframe to complete. If you would like to become a First Line Assessor, you can select your level of participation using fellows interface or contact the CHASM office by phone or email.

CONDUCTING A SECOND LINE ASSESSMENT

Second Line Assessment occurs when an independent peer is selected from the same specialty, or sub-specialty, and is provided with a copy of the patient medical record and the completed surgical case form to review. Second Line Assessors are required to review the case to address any possible areas of consideration, concern, or an adverse event (ACON), raised by the First Line Assessor following review of the surgical case form. The Second Line Assessor provides a written report (Appendix 1) which is a feedback letter to the operating surgeon.

Some cases are referred to Second Line Assessment because there is insufficient information for the First Line Assessor to make a clear determination. To avoid unnecessary second line assessments, these cases are referred to the CHASM Chairperson for consideration as it may be necessary to contact the operating surgeon to request further information. The additional information should provide enough detail for the Chairperson to decide whether to close the case at first line or proceed to second line assessment.

ACCESSING THE REPORTING SYSTEM

CHASM has its own access point for fellows interface on the RACS Bi-National Audits of Surgical Mortality landing page due to the legislative requirements to keep state health data backed-up in New South Wales. It is preferrable to sign-on using your ANZASM credentials; CHASM username (e.g., SmithJ-CHASM) and password. If you do not have a CHASM username, or you are unsure what your username is, please contact the office on **9269 5530** or email: CEC-CHASM@health.nsw.gov.au

Access the ANZASM fellows interface for CHASM using this QR code. Refer to Appendix 2 to self-report a death.

CHASM

COLLABORATING HOSPITALS' AUDIT OF SURGICAL MORTALITY

LESSONS LEARNT

LESSONS LEARNT

CHASM regards its peer review program as both a collaborative activity (hence the name) to provide valued feedback to surgeons, and as a means to monitor and improve the quality of surgical care.

CHASM encourages participation from all public and private health facilities in New South Wales. The provision of patient records is an important step in enabling independent peer review to be completed and enables feedback to the surgeon in a timely manner.

The CHASM program collects data from a very personal, subjective viewpoint, outside of the treatment environment. The data collection is protected under state legislation as specially privileged information, which provides assurance to participating surgeons and facilities that anonymity remains paramount to the program with authority to disclose privileged information set at the highest level – delegated by the Minister for Health to the Secretary, NSW Health.

Introduction

In this section of the publication, CHASM has selected 19 cases of varying educational significance and complexity. In particular, the final 4 case examples are educative in terms of difficult surgical case management.

Several of the cases had patient admissions on a Friday, Public Holiday or over the weekend, and these demonstrate the importance of clear communication and paths of escalation to avoid delays to diagnosis of surgery. The majority of patients are aged under 70 years of age, with examples of disability, diabetes, dementia and delirium.

Overview

An overview of key issues is provided by Dr Drew Dixon, Orthopaedic Surgeon.

Delay

- Late referral to a surgical team
- Delayed transfer for bowel ischaemia
- Delayed management of coronary artery disease and graft failure
- Delay in the case of endometrial CA, biopsied by D&C, where histology was not reviewed and subsequently there was a large pelvic mass with ureteric obstruction

Prolonged or delayed intervention

- For example, nasogastric tube (NGT) not used post-operatively in paralytic ileus following prolonged laparotomy
- Case of bleeding infected vein graft and stent for iliofemoral arterial disease with late recognition of vein patch disruption and stent erosion. A metallic stent inserted acted as a foreign body, promoting a septic focus.

Incomplete Intervention

- In a case of delayed diagnoses of infected aorto-iliac bypass graft where the patient refused bilateral above knee amputations, could have been salvaged by earlier re-vascularisation and due to its inherent complexity, a second vascular surgeon would have useful, as well as a laparotomy for possible bowel perforation.

Missed diagnosis

- Bowel infarction case (extensive mesenteric ischaemia)
- Internal mammary graft dysfunction leading to myocardial ischaemia

Loss of chance

- By not doing an interoperative cholangiogram, CBD obstruction was missed
- Ignoring an enlarging umbilical hernia (in a case of chest trauma) which became irreducible

Infection

- Most of these terminal cases exhibited terminal sepsis in patients with diabetes, resistant organisms, nosocomial infections and infected vascularised grafts, leading to secondary peritonitis.
- Early drainage, appropriate antibiosis and continuing consultation with the microbiology team re the development of resistant strains would be useful.

Ischaemia

- Early intervention, such as emergency laparotomy with suspected mesenteric ischaemia on CT angiogram, can be lifesaving.
- Arterial stents may occlude, particularly if infected and more conventional venous bypass grafts may need consideration.

Ileus

- In emergency settings, the insertion and retention of a nasogastric tube (NGT) would be helpful while stabilising the patient on ‘suck and drip’ in acute post-operative care.

It is hoped when reading these case examples, you may be able to relate the above points with the lessons learnt and assess your own surgical environment to identify if there are any areas that may be adjusted to improve patient safety.

CASE EXAMPLE 1

The CHASM Program invites surgeons to participate in a peer review process of patients who were admitted under the care of a surgeon. As a result, some of the learnings identified by the program are not necessarily surgery-related but still highlight areas of improvement, or at the very least, areas where more consideration around delivery of services may be useful. The inclusion of First Line Assessor comments in this report, is to raise awareness of the process of retrospective peer review and the perspective from which an assessor reviews a case.

Bearing this in mind, the first case example shared in the CHASM 2020 Annual Report is an urgent admission for a patient with mild intellectual disability, where no surgery occurred.

TRAUMA EMERGENCY - Motor Vehicle Accident involving an Oncology Patient

Summation provided by Professor Zsolt Balogh: CHASM Committee member; Director of Trauma Services, Senior Staff Specialist Orthopaedic Trauma Surgeon and Trauma Surgeon, John Hunter Hospital and Hunter New England Local Health District; Professor of Traumatology, Professor of Surgery, University of Newcastle.

This very challenging case highlights the difficulties of decision making in major trauma in a regional setting with tonsillar cancer related airway compromise and obesity.

The patient was the driver in a single vehicle car crash and self-extricated at the scene. The ambulance service had difficulties during transfer to the base hospital due to the level of agitation of the patient. Due to the pre-existing airway obstruction (tumour) and body habitus, the patient was transported in a semi-sitting position to a base hospital.

This scenario would challenge any trauma centre to start with, but clearly no quality diagnostics and survival can be expected without secured airway in a hypoxic, periodically desaturating patient with depressed skull fracture and associated traumatic brain injury.

The optimal management could have been endotracheal intubation with the best available medical and equipment resources at the settings, where all back-up options are available including surgical airway. This, depending on the institution, can happen in the Emergency Department, Intensive Care Unit or in the operating room (theatre) by few specialties with advanced airway management skills.

Once the secure airway is established and the complete diagnostic imaging performed, the local surgical team and consulting neurosurgeon from the major trauma centre, together with the critical care physicians and family, could have decided about the best management of the patient in the context of their injuries and malignancy-associated life expectancy.

The decision not to secure the patient’s airway could be reasonable in a palliative context, with agreement of the patient and family wishes, but unlikely to have any positive outcome if active treatment is considered.

CASE 1 – GENERAL SURGERY

Scenario: Patient admitted to Emergency Department with isolated head injury with deep lacerations and depressed skull fracture following a motor vehicle accident. No other significant intracranial injury was identified.

Background: An obese patient aged in their early 50s with mild intellectual disability, Type II diabetes, a smoker, hypercholesterolaemia and known laryngeal cancer, having (presumed) chemoradiation and on warfarin.

First Line Assessor's comments on reading the Surgical Case Form

The three significant events described by the surgeon should be looked at in more detail.

- Decision not to secure airway when, in retrospect, respiratory arrest was inevitable.
- Inability to access oncology records caused increased difficulty in decision making.
- Failure to involve anaesthetic consultant on-call to discuss airway situation.

PEER REVIEW REPORT

Sequence of events

The patient was involved in a single vehicle accident in the late evening on a weekday. They were conscious and alert when ambulance officers arrived at the scene but became quite agitated en-route to hospital and challenging to manage.

Shortly after arrival to the Emergency Department a CT scan was arranged which indicated significant progression of the patient's cancer with poor tracheal patency at C6. The patient evidently had stridor and respiratory failure due to airway compromise from the tumour. Oxygen saturation fluctuated between high-eighties and high-nineties. The patient was more settled when able to sit upright and have more control of the situation. Neurosurgery review was planned and ICU admission.

The surgical registrar advised the consultant of the trauma patient approximately two hours after admission. At this time the ICU and ED team had conferred and decided not to attempt to secure the airway. The patient was noted as high-risk for falls due to repeatedly slumping forward when sitting in a chair, and there were concerns about intermittent agitation. However, the patient was able to walk around the department without issue.

The patient was transferred to ICU, requiring oxygen en-route, which escalated to 100% on arrival. Oxygen saturation was continually fluctuating for 45 minutes before rapid deterioration and hypoxic cardiac arrest. Attempts at intubation and tracheostomy failed. CPR was unsuccessful. The patient was pronounced dead 5 hours after ED admission.

Learning Points

In my opinion this patient should have been transferred to a tertiary facility with neurosurgical services before deteriorating. Also, the airway risk assessed as early as possible on admission/presentation to ED; and managed appropriately.

I believe if this was addressed as a matter of urgency, during the early stages of admission, the patient may have survived.

Additional comments from the operating surgeon

The airway situation was not discussed by ED or ICU either with me or the anaesthetic consultant on call. I was not advised of the patient's death until the next day.

CASE EXAMPLE 2

The CHASM Committee has reviewed several cases this year which highlighted challenges with clear communication and contribution from family, carers and guardians in managing expectations.

Obtaining information on the patient from persons who play prominent roles in their everyday care, may assist teams to identify a baseline for the patient, as well as conveying their wishes in terms of treatment options and ceilings of care.

This case has added complexity as the patient has an intellectual disability with potentially challenging behaviours during the duration of the admission.

CASE 2 – ORTHOPAEDIC SURGERY

Scenario: Patient admitted for elective left TKR (Total Knee Replacement) for advanced osteoarthrosis associated with a marked knee deformity.

Background: A patient aged in their early 60s with intellectual disability, cardiac conditions, obesity and diabetes, pre-operatively flagged as high-risk due to their intellectual disability.

First Line Assessor's comment on reading the Surgical Case Form

- This is a young patient despite their disability.
- The surgeon had some concerns about the management after the surgery, but it is unclear what investigations and preparation this patient underwent before surgery.

PEER REVIEW REPORT

Sequence of events

The patient underwent left total knee replacement for advanced osteoarthrosis associated with a marked knee deformity on a Thursday. The decision to offer a total knee replacement was correct at the time. The surgery, though complicated, was performed uneventfully and the subsequent events were not related to the knee replacement or the knee arthrosis.

The patient's co-morbidities were exacerbated by their intellectual disability and their reduced ability to both co-operate and to communicate. It was clear from the pre-admission clinic that they were on beta blockers (propranolol) and a SGLT2 (sodium-glucose transport protein 2) inhibitor, known to be associated with euglycaemic diabetic keto-acidosis. This and their anticoagulants were noted by the anaesthetist and ordered to be ceased prior to admission. The patient was bradycardic on several ECGs, but this was interpreted as an error in the ECG reading rather than an alert to an underlying problem, possibly of beta blocker overdose.

In the post-operative period the patient was uncooperative, especially with regard to having post-operative blood tests undertaken. This made it difficult to monitor their blood sugar level especially, and other parameters of physiological recovery from the surgery. As a result, on post-operative Day 4 (a Monday), after an uneventful immediate post-operative progress until then, the patient became unwell: uncooperative, emotionally labile, bradycardic, nauseated and vomiting.

Despite a family member drawing their concerns to the attention of both the nursing and medical staff, the patient's challenging behaviour hindered the ability for clinical assessment, other than to provide observation. In the early hours of that day, they had a cardiac arrest and despite desperate attempts to resuscitate, the patient succumbed to their physiological disturbances which included: 1.) bradycardia, 2.) hyperkalaemia, 3.) acidosis and 4.) hyperglycaemia.

It is possible that these were post-mortem changes, but the possibility exists that, to some extent, all four were present that afternoon when the family noted the deterioration and may have contributed to the patient's demise. The suddenness of the cardiac arrest may also be the result of a pulmonary embolus after the knee replacement; however, this information is not contained in the medical notes available.

Areas of good practice / Areas for consideration

The patient was well assessed in the preadmission clinic by the anaesthetist who anticipated many of the problems and acted accordingly. The surgery, though difficult, was performed correctly and any issues directly related to the knee did not contribute to the adverse outcome.

A family member was the patient's main legal guardian and had authority to allow for sedation if this was required for treatment. Although it seems that this information was documented, it did not come to the attention of the staff, so was not invoked. Consequently, the difficulties in obtaining blood, meant no sample could be collected and therefore no monitoring of the patient's physiological progress was made.

Learning points

Given the patient's bradycardia in the PAC and past use of the SGLT2 inhibitor for Type II diabetes, it would have been prudent to exclude problems related to these medications, even if being difficult to venepuncture made this task more challenging. Had the ward been more aware of the family member capacity to consent to sedation for this, closer monitoring of the patient's condition would probably have unmasked the problems that unfolded at an earlier time and possibly pre-empted the rapid deterioration that led to cardiac arrest.

Additional comments from the operating surgeon

A very valuable incident investigation RCA/SAER was conducted with several discussions at M&M meetings.

Although the final cause of death is not known, a series of oversights were identified including communication, cardiac and diabetic medication issues, and the afterhours team being misled by the patient's seemingly stable condition, likely resulting in the sudden deterioration of the patient.

CASE EXAMPLE 3 & 4

The next two cases occurred in an Acute Surgical Unit (ASU) setting.

Acute Surgical Units are specialised units for patients who may need surgery and specialised care, but whom are generally well and expected to make a fast recovery. ASU staff are trained to get patients ready for surgery and to support them for the best recovery.

The first case example is a multi-surgeon case with input from the Vascular Surgeon and the General Surgeon involved with treating the patient.

CASE 3 – VASCULAR & GENERAL SURGERY

Scenario: Patient presented to Emergency Department in the middle of the night with acute abdominal pain and admitted to the Acute Surgery Unit under general surgery.

Background: A patient aged in their mid-80s was diagnosed with acute mesenteric ischaemia secondary to superior mesenteric artery (SMA) thrombus on the background of cerebellar ataxia and speech impairment.

First Line Assessor's comment on reading the Surgical Case Form

- The surgeon did not confirm when the imaging was done.
- Why wasn't the patient admitted under Vascular Surgery?
- Communications seem delayed in the context of the patient's deterioration.

PEER REVIEW REPORT

Sequence of events

The patient presented with ischaemic bowel and the initial documented plan, after speaking with the vascular surgeon, was for thrombolysis. Initially no evidence of peritonitis, heparin was started. Vascular team to review in the morning.

However, the patient deteriorated over the next few hours - lactate 3.8 and peritonitic – and a decision was made for urgent surgery. At that time the plan changed to open thrombectomy rather than thrombolysis. The patient underwent open laparotomy, SMA thrombectomy and open abdomen with VAC dressing that morning. It was an uneventful operation with the patient transferred to ICU intubated.

The patient experienced ongoing deterioration in haemodynamics and increasing ionotropic requirements since admission to ICU. Discussion with the family that evening about ceiling of care. Following the Vascular review in the morning of post-op Day 1, the patient was formally palliated and passed away a few hours later.

Learning points

SMA thrombosis and acute mesenteric ischaemia has a high mortality and morbidity associated with it. Perhaps the patient could have been operated on urgently rather than waiting till the next morning, as by then, the patient was unwell haemodynamically with an elevated lactate and was peritonitic. Despite this, the outcome may not have changed.

Additional comments from the operating surgeon

In retrospect, I would have preferred to be informed of the patient's deterioration post-operatively to enable collaboration in the family meeting.

CASE 4 – GENERAL SURGERY

Scenario: Patient brought into hospital Emergency Department by ambulance after an unwitnessed fall causing a head injury and painful hip.

Background: A patient in their late 60s with anxiety and history of smoking 5-6 cigarettes a day (≥ 40 years), had a Hartmann's procedure for perforated diverticulitis five months earlier.

First Line Assessor's comment on reading the Surgical Case Form

- Despite the difficulty in managing this patient with severe co-morbidity and a high risk of death, it does appear that a radiological diagnosis of a closed-loop obstruction was made following many days of obstructive like symptoms.
- The acute surgical team reviewed the patient and overrode the diagnosis of a closed-loop obstruction leading to a delay of 9 days until a laparotomy, where a closed-loop construction with non-viable bowel was evident.

PEER REVIEW REPORT

Sequence of events

The patient was brought into ED (on a Monday) following a fall with a fractured NOF (neck of femur). The following day, a hip hemiarthroplasty was performed, requiring a return to theatre for a closed hip reduction after ongoing pain and internal rotation was noted.

On post-operative night of Day 7, they were noted to have abdominal pain and distension, with ASU consult in the early hours of Day 8. An urgent CT scan was performed showing gallstones and multiple dilated small bowel loops and ascites, but no transition point - stoma remained active. The patient was made NBM (nil by mouth), but diet progressed again as symptoms resolved and the stoma remained active throughout. There were ongoing respiratory concerns (CT showed bilateral pleural effusions and subcutaneous fluid suggestive of fluid overload) during this time, and palliative care was involved as the patient had a ceiling of care (not for invasive ventilation) and was experiencing anxiety-related dyspnoea.

On the morning of Day 17 post-op, the patient complained of hip pain and upon review the leg was straight and not painful on movement. That evening, x-ray confirmed dislocation of left hip with theatre booked for the morning. The next day, on the weekend, the patient returned to theatre for a cement-in-cement revision of hip hemiarthroplasty.

On Day 20, the abdominal pain returned, this time with reduced stoma output. An abdominal x-ray the next day showed dilated small bowel loops and proximal colonic faecal loading. An enema was given, which was effective, and the patient improved clinically. Three days later, the patient was transferred to the rehabilitation ward, and was reviewed for hyponatraemia, exhibiting new supra-pubic pain.

The next day (Day 25), CT scan of the abdomen showed a small bowel obstruction without definite transition point. Review at 19:45 hours by the ASU consultant who also reviewed the CT and felt this was a closed loop obstruction. Theatre was booked and the patient handed over to the next ASU consultant on duty. However, this consultant did not think there was a closed loop obstruction and discussed the CT with the radiologist, who agreed there was no closed loop but a transition point in the right iliac fossa (documented in the notes, but not on the CT report). Surgery was cancelled with a plan to continue conservative management.

Over the next seven days, the patient improved from an obstructive point of view to the point where the stoma was active, NGT was removed, and a fluid diet was tolerated. However, the patient continued to struggle from a respiratory point of view and was very deconditioned.

Eight days after last CT abdomen, the patient stopped passing flatus and became distended. Abdominal x-ray showed dilated small bowel loops. An NGT was reinserted.

In the early afternoon of the following day, a clinical review for tachycardia and ongoing pain was done. Two hours later, there was a MET call for hypotension. The patient was noted to be peritonitic, commenced on intravenous antibiotics and taken to theatre for a laparotomy.

Enteric free fluid was noted with non-viable distal small bowel secondary to a closed loop obstruction related to a band adhesion. An ileocolic resection was performed (150 cm of small bowel remaining) without anastomosis. An Abthera™ dressing was applied. The patient was transferred to ICU intubated.

Two days later a relook noted healthy bowel. A stapled ileocolic anastomosis was fashioned, and the abdomen closed. Over the days that followed, the patient was stepped down to the ward and progressed well, from an abdominal point of view, recovering gut function. However, deterioration continued from a cardiorespiratory view with saturation recorded at 83% and palliative care were again involved as anxiety-related dyspnoea continued. There were also new concerns regarding the hip wound (positive for pseudomonas aeruginosa), which would have benefited from a washout.

Three days later a family discussion was held for clarification of ceiling of care and to explain the two management pathways, and the patient expressed their wish for non-operative management. Desaturation, shortness of breath and hypercapnia worsened with a PACE and MET call in the early hours of the next morning. Following further deterioration and deconditioning, the patient progressed to a CPAP machine but continued to fatigue, passing away 48 days after admission.

Areas of good practice / Areas of consideration

There was excellent documentation throughout, including NELA (National Emergency Laparotomy Audit) data and discussions re: prognosis and ceiling of care. Expectations were realistic from the start and palliative care was involved early. Team interactions between orthopaedics, cardiology, respiratory, surgical, ICU and allied health were timely and appropriate based on the notes, and communication does not appear to have been an issue. There were no delays in getting to theatre once this was booked.

The handover between ASU consultants led to a sudden and significant change in plan (not to operate). This may have led to some confusion for the patient and family, but it appears to have been handled well from the notes. This is not really a deficiency of care, just a consequence of different clinical opinions in a revolving ASU model.

Learning points

This patient had severe pre-operative pulmonary disease and was clearly a very high anaesthetic risk, and the five anaesthetics administered contributed to the respiratory deterioration. It is challenging weighing up the risks and benefits of conservative versus operative management of small bowel obstruction in such patients.

In view of the operative findings at laparotomy, it is clear the patient would not have survived conservative management at that point. That said, it was not unreasonable to do so to begin with, as the improvement over the following seven days shows the bowel was not threatened at that point. Once the deterioration was clear, there was an appropriate and prompt plan for surgery.

This case demonstrates that “closed loop small bowel obstruction” is not always a black and white diagnosis as far as operative versus non-operative management is concerned. It is probable that there was intermittent obstructing and resolving in the lead up to the dramatic deterioration event. One could argue that had laparotomy occurred earlier there may not have been the need for bowel resection, but at that point, there was still a good chance that it would resolve with conservative management, which would be far preferable in view of the patient’s poor medical condition.

CHASM Comment: The Committee has discussed several second line assessments where patients were admitted to an Acute Surgical Unit for clinical management. Varying perspectives were shared about what appears to be a lack of consistent practices affecting communication and handover. In some instances, a change in management plan has occurred with the next handover team, reducing continuity of care. Suggestions from the Committee for areas of potential improvement include:

- Supervision, or lack of, and transfer of care
- Timely decision-making to avoid delays
- Unclear escalation processes, particularly for ICU involvement
- Demarcation disputes leading to delays and miscommunication
- Long-term complex patients benefit from single team follow-up
- Lack of co-ordination amongst teams leading to misdiagnosis or delays

CASE EXAMPLES 5 to 15

The next 11 cases are selected to provide learnings focused on delivering excellent clinical care. These may highlight areas of potential improvement, or at least deliver an alternate viewpoint from which to consider the next time you are presented with a complex patient in a challenging setting.

CASE 5 - GENERAL SURGERY

Scenario: Patient admitted to Hospital A with rectal bleeding. Upon CTMA (computed tomography mesenteric angiogram) confirmation of bleeding from the sigmoid colon in a strictured segment of colon they were transferred to Hospital B (in the same LHD) for embolisation.

Background: A patient aged in their late 80s with a history of ovarian cancer, treated with hysterectomy and oophorectomy and radiotherapy.

First Line Assessor's comments on reading the Surgical Case Form

- If a decision was made not to admit the patient to ICU/HDU, ethical questions arise as to what, if any treatment should be provided.
- In hindsight, scope-confirmed mucosal necrosis may indicate possible bowel infarction.

PEER REVIEW REPORT

Sequence of events

The patient underwent angiography and embolisation over the weekend (Day 2 of admission). There was no active bleeding at the time of the procedure.

The patient was assessed by an ICU physician who felt admission to HDU / ICU was not necessary at that time. The patient then had a large rectal bleed the following morning with haemodynamic collapse. The surgical consultant decided to proceed to laparotomy, but the patient had a cardiac arrest in the anaesthetic bay. After resuscitation, flexible sigmoidoscopy showed ischaemic mucosa in the area of embolisation. A decision to palliate was made at this time and the patient passed away later that day.

Areas of good practice / Areas for consideration

The surgical decision-making and care seem entirely appropriate in this case. The decision not to admit to ICU after embolisation was appropriate given the patient's stability.

There could be concern about the radiologist's description of truncated vascular anatomy at the site of previous surgery. If truncated vascular anatomy was observed during an inferior mesenteric artery (IMA) run, it suggests a previous sigmoid / rectal resection, which was not recorded elsewhere in the notes provided. A decision to perform angio-embolisation in this setting is very high-risk for causing infarction.

Depending on the local institution, the standard protocol is only to perform angio-embolisation if active bleeding is demonstrated at the time of procedure, and not based on the appearance of CTMA imagery.

Learning points

This case highlights the importance of communication between radiologist and surgeon when managing rectal bleeding.

It also highlights the importance of advanced care directives and setting limits of care in consultation with patients and families.

CASE 6 – GENERAL SURGERY

Scenario: Patient admitted to Hospital A on a public holiday, diagnosed with transverse colon perforation and transferred (the same day) to Hospital B (in the same LHD) for management.

Background: A frail patient aged in their mid-80s, mobilising with a weight-bearing stability aid and living with their partner, with a background of hearing loss, hypertension, gastric reflux, previous TURP and previous Hartmann's operation and reversal (possibly for malignancy).

First Line Assessor's comment on reading the Surgical Case Form

- Was there enough justification from CT for the pre-transfer team to assume this was diverticular / non-cancer-related perforation? And was the patient obstructed as well?
- Given that the patient does not have other comorbidities (as per the completed surgical case form, apart from age), a decision to operate would have been appropriate, given that the patient was in reasonable condition pre-operatively.
- What was the exact duration and reason from the initial presentation to pre-transfer institution to the time of surgery under this surgeon, against the 10 days of non-operative management?
- It would help to find out whether the patient was actually continuing to deteriorate through their transfer process, and even in the pre-op stage, which would support the evidence that the delay in diagnosis had contributed to their deterioration.
- What is meant by "acute respiratory failure" as a cause of death - especially if they had no pre-existing comorbidities - was it pneumonia? ARDS? Fluid overload?

PEER REVIEW REPORT

Summary

The patient was transferred from Hospital A to Hospital B with a contained transverse colon perforation and was initially treated non-operatively but failed to improve. An operation was carried out on Day 10 of admission (a Saturday) and a perforated cancer was identified and resected. Despite initial slow progress, the patient ultimately failed to thrive and had issues with fluid overload causing respiratory failure and death on Sunday, post-operative Day 8 on Day 18 of admission.

Sequence of events

The patient was admitted to Hospital B on a public holiday with a contained transverse colon perforation identified on a CT scan. They were admitted under Consultant A that evening, made NBM (nil by mouth) and placed on intravenous antibiotics.

On Day 1 of admission, the patient was reviewed by the colorectal registrar (for Consultant B who took over the patient's care) and discussions were had with the patient's partner. They were made not for CPR, and it was agreed that it would be better to keep them comfortable rather than suffer through surgery. It is noted that the patient was having regular colonoscopies for polyps until 2 or 3 years ago.

On Day 2, the patient appeared to be improving with down-trending inflammatory markers. It was explained to the patient's partner that an operation may be offered if there was clinical deterioration. It is also explained that surgery would be high risk, may lead to functional decline and may require the formation of a stoma. Plans are made to commence TPN.

A note in the medical record on Day 5 described the patient as complaining of pain, however, the inflammatory markers had improved and their bowels were working. Allied health referrals were made and generalised oedema was noted.

On Day 9, it was decided to operate on the patient due to increasing pain. This decision was made by Consultant C, who had now taken over care of the patient (it is not clear when this occurred according to the medical notes). The patient was transfused due to low Hb (77 g/L). An anaesthetic review that day described the patient as "High anaesthetic risk, in view of frail premorbid status".

On Day 10, the patient underwent a laparotomy, adhesiolysis and extended right hemicolectomy to treat a perforated transverse colon cancer. They were admitted to ICU for short lived inotropic support.

Over the next few days, the patient became even more fluid overloaded, was transfused for low haemoglobin and developed runs of AF.

On Day 14, the patient's bowels become active but by this stage was requiring full feeding assistance due to dysphagia. They were placed on a thickened fluid diet. IV antibiotics were stopped.

On the Day 15 the patient was deemed as suitable for ward care but was quite deconditioned and remained grossly oedematous. Once on the ward, the patient became anuric, despite being clinically fluid overloaded.

Over the next couple of days, the patient was reviewed by geriatric medicine, cardiology and ICU.

The main takeaway was to give intravenous albumin to the patient to help with the oedema. A transthoracic echo was planned to check cardiac function. Pleural effusions were noted on chest x-ray.

On the Day 18, the patient became tachypnoeic and acidotic. IV antibiotics were recommenced.

The patient was treated with non-invasive ventilation as they were not for CPR or intubation. The patient's GCS dropped, and they had a cardiac arrest, passing away.

Areas of good practice / Areas for consideration

The early discussions with the patient and their partner about the reasoning for the non-operative management are sound and the potential drawbacks of surgery are reasonably addressed. However, these discussions do not eliminate the potential of surgery altogether, which is certainly a very difficult discussion to have. Given that the patient was already frail, surgery may have been better performed early on, or not at all, as leaving it as a "last resort", when the patient has deteriorated, all but eliminates any chance of salvage.

The other factor, which is very difficult to address, is the frequent change of surgeons over the public holiday period, which is very common in many hospitals. Consultant C clearly disagreed with the other consultants' initial diagnosis (as per Consultant C's report) and felt compelled to operate because he suspected a missed malignancy. If a plan had been made from the start that the patient was not for surgery at all, then Consultant C may not have had to make that decision at that late stage. Nevertheless, the plans from the earlier surgeons did include the option of surgery if there was a failure of non-operative management, which was the case. As a side note, it was not unreasonable for the earlier surgeons to not suspect colonic cancer initially, given that the patient had been having regular colonoscopies.

Finally, it seems that the patient suffered from intractable fluid overload, perhaps due to a failing heart, presumably from sepsis. Given how difficult this was to treat, it would seem that this was overlooked, as this is a fairly significant predictor of poor post-operative outcome.

Learning points

The main learning points here relate to the management of frail patients and futile surgery. Given that everyone agreed that this patient was a very high-risk surgical candidate, a firm decision at the start that states that the patient is not for CPR, intubation or surgery would have removed the prolonged ICU admission and prolonged post-operative failure to thrive.

The outcome would have been the same, meaning that surgery was futile and could have been avoided.

Additional comments from the operating surgeon

This patient's demise was partially complicated by the public holiday period where there are issues with continuity of care.

CASE 7 – PAEDIATRIC GENERAL SURGERY

Scenario: Paediatric patient with a limited life expectancy admitted to hospital with a suspected respiratory tract infection.

Background: A toddler with multiple co-morbidities and a complex medical history which included: Trisomy 18, congenital heart disease and global developmental delay.

First Line Assessor's comment on reading the Surgical Case Form

- There is no elaboration on the delay in diagnosis and whether any changes to routine care were required.
- No infective organism specified though apparently identified.

PEER REVIEW REPORT

Sequence of events

On admission (mid-week) the patient was known to have multiple underlying diagnosis including: Obstructive Sleep Apnoea, Trisomy 18-mitotic non-disjunction mosaicism with a limited life expectancy, previous VSD (ventricular septal defect) closure and a bicuspid aortic valve, pulmonary hypertension probably due to OSA (obstructive sleep apnoea), global developmental delay, PEG feeding and a horseshoe (fused) kidney under observation with risk of Wilms Tumour (nephroblastoma).

The patient was treated initially with IV fluids, CPAP and oxygen, Augmentin, respiratory care and commenced gastrostomy fluids between Days 0 and 1 of admission.

They had ongoing losses and failure to tolerate PEG feeds with initially coffee ground vomits that progressed to faeculent vomiting. An abdominal x-ray and ultrasound suggested a bowel obstruction and the surgeons were requested to review.

A laparotomy was performed on Saturday (Day 4), which showed a Meckel's Diverticulum with associated band and fibrous adhesions. The patient underwent a resection of the diverticulum (wedge) and resection of the terminal ileum and colon (25cms). Antibiotics (Tazocin) were commenced before surgery. They initially settled but by Monday (Day 7) had increasing abdominal distension and fevers. The surgeons reviewed the patient's progress and elected for a second look laparotomy (that day). The anastomosis was intact but friable and the surgeons reformed the anastomosis.

Again, the patient initially improved [passed flatus] and a PICC line was inserted on Friday (Day 10) without any anaesthetic complications.

Then over the next two days (weekend), they developed significant fevers (>40 degrees), increasing abdominal distension, bile-stained aspirates and a wound dehiscence where the bowel was visible (1 cm). They had a drop in Haemoglobin, that was managed with blood transfusion prior to the laparotomy and platelets were low (actual results not available, but bleeding was not an issue during surgery). It was also recognised that they had developed hypokalaemia, but this was managed with both oral and IV replacements prior to surgery.

Subsequently on Sunday (Day 12), the patient returned to the OR, early around 05:00hrs, where a third laparotomy was performed at which a small (8mm) localised perforation was noted that was sealed with mesentery. The anastomosis was taken down and refashioned without difficulty.

During the third procedure the patient developed arrythmias, bradycardia and a-systole which did not respond to active resuscitation. The anaesthetic record shows an appropriate response and actions taken during the resuscitation. The patient was pronounced deceased in theatre.

Areas of Good Practice / Areas for consideration

While it is difficult to be completely sure from the case notes, this patient seemed to be appropriately managed from a surgical perspective once the diagnosis had been reached. It is possible that an earlier diagnosis (recognising a bowel obstruction as the cause of their vomiting) might have resulted in a less complex post-operative course.

If there had been no necrosis and a simple band adhesion that only required a removal of the Meckel's Diverticulum, then perhaps the subsequent laparotomies may not have been required.

It was not until the final procedure that the cardiac issues (arrythmias, bradycardia) arose, the three previous general anaesthesia and interventions (2 x laparotomy and 1 PICC line) had gone well from a cardio-respiratory perspective. By the time of the third laparotomy, they had sustained other complications (a falling Hb and Potassium) which, although managed, all contributed to the increasing risks.

The procedures were performed by senior paediatric surgeons and the techniques were appropriate with the use of both staples and hand-sewn anastomoses. Antibiotics, admission and discharge from PICU and management of fluids and pain relief seemed appropriate both in terms of recognition and management. Parental consultation and support is noted throughout, with involvement of allied health and nursing staff.

The Coroner's Office was contacted but the patient was not required to be referred to the Coroner for further investigation. It is noted that the surgeon stated that an investigation was conducted, which did not identify any significant issues.

Learning Points

1. A learning point is that any child with known chronic and complex care, particularly those with developmental delay, there should be an increased suspicion of surgical diagnoses.

Diagnostic anchoring around the illness being related to the underlying pathology, rather than a surgical diagnosis, is not uncommon and, as in this case, can result in unnecessary delays, morbidity and mortality.

This increases the risks of the underlying pathology being more advanced than with a prompt diagnosis. Particularly with bowel obstruction where the delays cause increasing impairment of the vascular supply and can lead to necrosis with the attendant surgical and other risks such as pain, fluid balance, respiratory impairment.

All junior staff should be alerted to the significance of bile-stained vomiting and/or large and unremitting volumes of gastric aspirate, particularly where the child has significant underlying complex conditions.

2. When a significant surgical event occurs, such as this mortality, senior staff should ensure there are comprehensive notes of the event, communications and actions taken. This should not be left to junior staff.

Additional comments from the operating surgeon

This case had an independent clinical case review to look for modifiable factors. No factors were identified. This patient died of an unexpected cardiac arrhythmia under anaesthetic.

Note: Trisomy 18 children have a very limited life expectancy.

CASE 8 – ORTHOPAEDIC SURGERY

Scenario: Patient admitted to hospital following consult with GP for pain / swelling of knee with fevers; suspected prosthetic knee infection. Transferred to Hospital B with multi-focal sepsis (chest and knee).

Background: A patient aged in their mid-60s, with several co-morbidities including ischaemic heart disease, poorly controlled diabetes, liver cirrhosis related to alcohol intake with portal hypertension, hypertension, and gout.

First Line Assessor's comment on reading the Surgical Case Form

- There is no elaboration on the delay in diagnosis and whether any changes to routine care were required.
- No infective organism specified though apparently identified.
- Why was an arthroscopic debridement performed for a grossly infected PJI (periprosthetic joint infection), that needed ICU (after patient was stable)? This needs to be clarified in the surgeon's account.
- Further, arthroscopic debridement of PJI has shown to be less effective than open debridement in the Australian setting (10.1016/j.arth.2020.06.039[3]).

PEER REVIEW REPORT

Sequence of events

In summary, the patient had a history of total knee arthroplasty done more than a decade prior and was unwell for at least a week prior to presentation at Hospital A. The patient was taken to theatre for arthroscopic washout, and copious pus was drained from the joint. They were stable intraoperatively and progressing well in ICU, until postoperative Day 4, when they sustained an acute myocardial infarction and passed away suddenly.

It is clear from the notes, a proper work-up to determine sources of infection was done by the ICU team at Hospital B. The knee was aspirated around in the morning, and, given the finding of a frank pus on aspiration an Orthopaedic team was promptly contacted. Right sided chest collection was drained by the Radiology Services in Hospital B following a discussion with Metro Hospital C Cardiothoracic Team.

An arthroscopic washout of the right knee was done after-hours on Day 1 at Hospital B. Based on the operation report provided in the notes and Orthopaedic team entry on the following day, a plan was made by the Orthopaedic team to proceed to an open debridement and liner exchange as soon as the details of the TKA implants became available. ICU was notified on the Sunday, that the surgery was slotted for the Wednesday.

The patient was appropriately treated for septicaemia, hyponatremia associated with SIADH (syndrome of inappropriate antidiuretic hormone) secretion, worsening kidney and liver functions, and raising troponin levels in the ICU over the weekend. Unfortunately, the patient's condition had acutely deteriorated around midday on the Monday prior to the planned surgery, passing away later that day.

The First Line Assessor provided a reference to a paper published at a date after this admission. It seems that results of the open debridement for prosthetic joint infection are superior to the merely arthroscopic debridement.

[3] https://www.sciencedirect.com/science/article/abs/pii/S0883540320306835?via%3Dihub

Nevertheless, in the setting of a patient with multiple co-morbidities and acute purulent prosthetic knee infection, an open debridement and synovectomy, with or without retention of the modular and fixed implants, could have been considered.

Areas of Good Practice / Areas for consideration

Management by the ICU team from the moment of admission was appropriate. Multiple teams and resources were timely recruited to provide the requisite care of the patient.

It is concerning that the subsequent surgery was scheduled 6 days (on the Wednesday) after the index procedure, in particular and under the circumstances, when there were no ongoing Orthopaedic Team clinical reviews for a 72-hour hiatus, from Friday to Monday morning.

Learning Points

It would have been advisable to transfer the patient for ongoing care to the nearest hospital with an ICU and operative Orthopaedic Team, if no Orthopaedic cover was available in Hospital B over the weekend.

The patient required monitoring by the Orthopaedic Team on a daily basis and a second surgery, whether arthroscopic or open, was required within the window of 24-48 hours from the first.

CASE 9 – GENERAL SURGERY

Scenario: Patient admitted with recurrent sigmoid volvulus with a signed Advance Care Plan stating: “for comfort measures only”.

Background: A patient aged in their early 80s, bed-bound and living in a high-care Nursing Home with autoimmune hepatitis cirrhosis, portal hypertension, Type 2 diabetes mellitus, ischaemic heart disease and dementia.

First Line Assessor’s comment on reading the Surgical Case Form

- The decision to operate when the patient had an advance care plan stating “no” for ICU, CRP, NG, IV fluids. For comfort measures only.

PEER REVIEW REPORT

Sequence of events

The patient was admitted on a Sunday with a sigmoid volvulus. An advanced care directive was noted. They were treated with endoscopic decompression and sent home the following day.

Two days later, on a Tuesday evening, the patient represented with the same complaint. The advanced care directive is again noted. A discussion in the ED between the patient and partner, senior ED doctor and surgical registrar advised that a laparotomy would not be in the patient’s best interest. There could be a high risk of complications due to the patient’s liver disease and low blood platelets. A prolonged ICU recovery could be necessary with a likelihood of no survival. Both the patient and partner agreed that this was not in their best interests.

It was proposed to wait until the morning team review them with a view to repeating endoscopic decompression.

That day, however, a discussion between surgical team, ICU team and patient’s family noted that despite high morbidity and mortality risk and poor quality of life, the family have decided to proceed with surgery with a focus on pre-operative optimisation.

A haematology consultation occurred on the same day for the low blood platelets (47). Advice is given on pre- and post-operative management of the patient’s coagulation profile. The patient is noted as a poor surgical candidate. There is a mortality risk of 10% for abdominal surgery and CP-A cirrhosis. Given the patient’s other co-morbidities, that included severe thrombocytopenia and poor functional status with likely poor resolve, risk of mortality is likely higher than above.

The operation is undertaken later that day. This was a laparotomy with on-table washout, adhesiolysis, sigmoid colectomy and end colostomy. The operation lasted three hours.

Two days post-operatively, the patient suffered a NSTEMI followed by acute pulmonary oedema and intra-abdominal bleeding.

On post-operative Day 3 (a Saturday) the patient was suffering from multi-organ failure and was made a palliative patient. After a period of comfort measures by the palliative care team, the patient passed away three and a half weeks after the surgery.

Areas of good practice / Areas of consideration

The initial decompression on the initial presentation was appropriate treatment and allowed the patient to return to the nursing home the next day. On representation, however, it is not clear why this treatment was not re-attempted, perhaps with a view to keeping the rectal tube in for longer and allowing the patient to have adequate oral intake and bowel action. This may have prevented such a quick representation by allowing the colon to decompress further. The likelihood of representation would be high (at least 50%).

The operation itself, however, was unusual. Even though this ended up being a Hartmann's resection, the need for on-table colonic lavage is not clear; presumably there was a thought of doing a primary anastomosis, although this is too, is not clear. The indication to operate emergently on such a poor surgical candidate is also not strong. There was no evidence of ischaemia, perforation or sepsis. It seems that the only indication to operate was to prevent recurrence.

An important factor here was the decision to operate at all. This was a very elderly patient with multiple co-morbidities, poor quality of life with an advanced care directive, which was presumably at the ready to prevent these types of situations.

From review of the notes available, it is very clear that every doctor involved in this patient's care was of the same opinion: that this patient would likely do poorly from surgery. Despite this, the documentation seems to suggest that it was the family that expressed desire for surgical intervention despite the medical opinions.

Learning points

The main point from this is that the decision to operate falls on medical practitioners and in particular, the surgeon. The family should not have been given the option of surgery as, in reality, it was not a realistic option. Often relatives will pursue futile interventions when given the option in order to feel that they did everything they could. Worse, when the intervention fails and the patient lingers in hospital until death (as in this case), they will often feel guilty about their decision. Instead, at a family discussion and with medical consensus, the discussion should go something like this:

"We are all of the opinion that anything more than endoscopic decompression will be futile and likely cause the death of your family member. As such, this will not be offered."

CASE 10 – GENERAL SURGERY

Scenario: Patient admitted for elective laparoscopic right hemicolectomy for the management of an endoscopically unresectable caecal lesion.

Background: A patient aged in their early 80s, pre-operatively assessed as ASA2, with mild renal impairment (eGFR 53) with no other known co-morbidities.

First Line Assessor's comment on reading the Surgical Case Form

- Details provided by the operating surgeon for clinical course are very brief.
- The development of atrial fibrillation was the clue to sepsis. Were there any other signs?
- Who was reviewing the patient? ICU, HDU or ward?
- Why was laparotomy not done sooner?

PEER REVIEW REPORT

Sequence of events

The patient underwent the procedure on a Friday, which was followed by a long weekend.

From the notes available, there was no medical staff entries between Day 0 (operative day) and the following Day 4 (a Tuesday), although the nursing notes confirm a resident was contacted regarding vomiting and the intravenous (IV) fluid rate increased.

Late on Day 4, the patient went into atrial fibrillation (AF) and the following morning had a rapid response call for tachycardia, tachypnoea and low oxygen saturations.

The surgical team saw the patient and a CT abdomen was ordered. The report on that non-contrast CT suggested a post-operative ileus, and commented on a small amount of intraperitoneal gas, but no evidence to support an anastomotic leak. A c-reactive protein blood test (CRP) was high at 350, as was the lactate at 3.8.

The patient was transferred to ICU where they were started on amiodarone and antibiotics. The working diagnosis appears to have been sepsis, possibly from aspiration pneumonia.

Initially, the patient stabilised somewhat on high-flow oxygen, (CRP came down to 282, lactate 1.8) but their AF was difficult to control, and eventually they required inotrope support on Day 9.

The patient returned to CT the same day (a Sunday) where free gas and fluid was identified in the abdomen. They were taken to theatre that day, where the stapled anastomosis was reinforced, a loop ileostomy fashioned, and a 10-litre washout undertaken, for faeculant peritonitis.

The patient spent four more days in ICU before being transferred back to the surgical ward, after being extubated. From there, their progress was slow and steadily downhill. They became delirious (the cause was never clear), often combative, and they interfered with IV lines and dressings, frequently contaminating the wound, staff and lines with faeces or drain fluid. At one point, the patient pulled out a pigtail catheter inserted into a subhepatic collection.

Abdominal swabs grew Pseudomonas and Candida, and antibiotics through a PICC line were changed from Tazocin to Meropenem and Fluconazole. The patient was on TPN (total parenteral nutrition) as they were assessed as unsafe to feed due to delirium.

A one stage, albumin fell to 17, and they became deconditioned and frail. The patient's partner, who was the legal guardian, sat through all this and watched them fading away. After geriatrician and palliative care referrals on Day 35, and discussions with the family, the patient was transferred to palliative care and passed away on Day 37 of admission.

Areas of good practice / Areas of consideration

This unfortunate patient underwent a laparoscopic assisted right hemicolectomy for a large caecal polyp, the histology of which was confirmed to be a tubular adenoma with high grade dysplasia. No malignancy was identified in this polyp.

With this patient there was a sliding doors moment, and in hindsight, an erroneous decision was made. On Day 5, the decision was made for treatment based on the CT scan rather than the patient, who was unstable. Supportive measures were put in place. Four days later the anastomotic leak, with faeculant peritonitis, was dealt with at laparotomy. The patient continued to drain purulent fluid from the lower abdominal drain for three weeks after the second laparotomy. A poor outcome for a potentially curable lesion.

Learning points

Having missed the first opportunity to deal with the leak, an argument could be made strongly to take this patient back to theatre on Day 11 for a repeat washout while still intubated and ventilated, in light of the amount of contamination found at the second laparotomy.

Additional comments from the operating surgeon

The patient was scanned at Day 5 following an episode of AF. The scan was reassuring with an anastomosis that looked intact. There was no improvement over the next few days, and ultimately the patient was taken back to theatre.

CASE 11 – NEUROSURGERY

Scenario: Patient admitted to Emergency Department following outpatient MRI brain demonstrating a 35mm ring enhancing lesion with 11mm midline shift.

Background: A patient aged in their late 20s with a two-week history of headaches associated with two days of nausea. No neurological deficit. No known co-morbidities.

First Line Assessor's comment on reading the Surgical Case Form

- What led to the initial delay in treatment - was abscess an unlikely diagnosis or was it not considered?
- Were steroids used, and if so, was any consideration given to the potential for these to aggravate the patient's condition; if the diagnosis was brain abscess, as proved to be the case?

PEER REVIEW REPORT

Sequence of events

The patient underwent an MRI brain on a Friday as an outpatient and was admitted to ED for observation following an abnormal result. The MRI reported as demonstrating a 35 mm ring enhancing lesion with 11 mm midline shift.

The patient was commenced on dexamethasone. The main differential diagnoses considered were those of tumour or abscess. The inflammatory markers were not significantly elevated.

During this admission they underwent several other investigations, and a repeat MRI brain scan was performed on Tuesday, 5 days later, at about 16:00 hours. There had been significant increase in the size of the lesion to 58 mm diameter with 14 mm midline shift.

The following morning (Day 6), the patient was reviewed. Clinically there was deterioration, with increased headache and vomiting, suggesting that the patient was exhibiting significantly raised ICP (intracranial pressure).

It is not clear that the deterioration was immediately recognised by the neurosurgical team as there was a note that the team returned to see the patient 30 minutes later.

The patient further deteriorated during the consent process and required resuscitation and emergent craniotomy for excision of lesion. No ventricular breach was identified intra-operatively. The patient was subsequently transferred back to the intensive care unit with a view to waking and weaning. That evening, the pupil ipsilateral to the craniotomy dilated and the contralateral pupil dilated soon after. The patient was urgently returned to the operating theatre for decompressive craniectomy and insertion of an external ventricular drain.

Post-operatively there was no neurological improvement, and the patient was subsequently declared deceased following brain death testing two days later.

A note from the neurosurgical registrar suggests that there was escalation with several discussions with the consultant regarding the timing of surgery during that period.

There was also a suggestion that the patient was initially reluctant to consider surgical intervention during this admission.

Areas of good practice / Areas of consideration

Of concern was that the patient was initially being consented for surgery on Saturday. The diagnosis was considered to be an abscess (later confirmed Streptococcus intermedius infection) at the time of consent, and it was rapidly increasing on MRI. To schedule surgery for several days later was not appropriate.

The patient's scan on the Tuesday (Day 5) was an indication for urgent craniotomy and removal of the abscess. In a young patient, with a rapidly increasing lesion of that magnitude, and increasing mass effect, it was inevitable that the patient was going to deteriorate. Neurosurgeons are all aware that patients can deteriorate very rapidly in the presence of an increasing mass lesion.

Learning Points

The patient should have, at the latest, been scheduled for surgery the next morning, given the results of the MRI of the previous day. Had the patient undergone surgery prior to the rapid clinical deterioration, then it is possible they would have had a different outcome.

Reference

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3502992/pdf/zjm4160.pdf

Additional comments from the operating surgeon

On reflection, given the differential diagnosis of intracranial infection, if given a similar clinical circumstance, surgery could be offered earlier in the admission.

CASE 12 – UROLOGY

Scenario: Patient readmitted to Hospital A shortly after planned Robotic assisted laparoscopic partial cystectomy was aborted at another hospital. They had hypercalcaemia and purulent urine; presumed to be urosepsis.

Background: A patient aged in their early 60s with a history of chronic pulmonary disease, obesity and treated schizophrenia, recently diagnosed with locally advanced sarcomatoid bladder cancer and associated recurrent fevers, leukocytosis and eosinophilia.

First Line Assessor's comment on reading the Surgical Case Form

- If it was deemed unsafe to perform open partial cystectomy, why should a robotic partial cystectomy be contemplated?
- It is known CO_2 insufflation would further embarrass respiratory function.

PEER REVIEW REPORT

Sequence of events

The patient's initial presentation was with haematuria, and this was investigated with cystoscopy where a diagnostic resection of cancer was performed.

Histology revealed a poorly differentiated sarcomatoid SCC (squamous cell carcinoma). Imaging suggested regional adenopathy, but not other solid metastases.

The patient was discharged after resection but re-presented with urinary clot retention requiring catheterisation and bladder wash-out. They remained catheterised from then.

The managing surgical team recommended palliative partial cystectomy by robot assisted laparoscopic surgery. This technology was only available at another hospital. This management was supported at a multidisciplinary team meeting. Efforts were made to reduce the hypercalcaemia with aggressive hydration, and antibiotics were prescribed for the presumed urosepsis, though urine and blood cultures were repeatedly sterile.

The patient gained 5kg over 2 weeks suggesting the aggressive hydration was leading to fluid overload. Urine remained purulent and inflammatory markers climbed despite the antibiotic therapy.

The patient was transferred to a hospital with robotic facilities for the planned surgery. After anaesthetic induction, the patient was moved to the Trendelenburg position and insufflation begun. This led to severe desaturation, and the operation was aborted. The patient was retrieved to the original referring hospital as it had an ICU, not available at the robot operating hospital.

The patient failed to improve despite optimal ICU care, with ongoing clinical sepsis, deteriorating respiratory function and failing condition / hypoproteinaemia.

With family agreement, a decision was made to withdraw treatment and the patient succumbed.

Areas of good practice / Areas of consideration

It is possible this patient's health and fitness for surgery was actually being adversely affected by overly aggressive hydration to treat hypercalcaemia, and there was apparent failure of the drainage and antibiotics to improve or resolve the presumed urosepsis, where active infection clearly impairs healing and recovery from surgery.

It is important to optimise a patient's fitness for surgery, and part of this is to ensure that the interventions are working. The patient must be regularly reviewed to confirm the intervention is having the desired effect and patient fitness is actually being improved.

In this case, a course of management that may have led to an ideal outcome in other circumstances has led to an unfortunate outcome.

Learning Points

Locally advanced or metastatic sarcomatoid bladder cancer is challenging to manage as it is particularly aggressive, classically rapid and inexorably progresses to death. When treatment goals are known from the start to be palliative, there is a strong case to select less invasive primary chemotherapy, radiotherapy or combination, rather than palliative resection surgery in the first instance.

Generally, minimally invasive surgery is beneficial to patients with reduction of pain, length of stay, and a lesser risk of a variety of complications. In select patients, however, open surgery may pose the lower surgical risk. With this patient’s obesity, chronic respiratory impairment, and putative acute fluid overload, the need for Trendelenburg and positive pressure pneumoperitoneum with laparoscopic surgery arguably posed a greater surgical and anaesthetic risk than would a simple open operation.

CASE 13 – GENERAL SURGERY

Scenario: Patient admitted to Hospital A with suspected bowel obstruction, emergency laparotomy performed and taken back for resection, then transferred to Hospital B for admission to ICU for clinical management.

Background: An obese patient aged in their early 60s with a history of moderate aortic stenosis, obstructive sleep apnoea, systemic sclerosis (scleroderma) with CREST syndrome (a multi-system connective tissue disorder requiring immunosuppression for management) involving liver (cirrhosis) and lung, and radiotherapy for previous vulval cancer.

First Line Assessor's comment on reading the Surgical Case Form

- Decision to resect and perform small bowel anastomosis on two occasions following leakage of small bowel anastomosis.

The formation of a stoma after the first or the second leak was identified was arguably the only opportunity to salvage this case. The surgical teams at both hospitals could have given strong consideration to exteriorising the small bowel as an ileostomy, rather than resecting the anastomosis and forming further primary anastomoses.

PEER REVIEW REPORT

Sequence of events

The patient had two prior presentations to the emergency department prior to diagnosis. During the first presentation signs and symptoms were attributed to pyelonephritis - discharged with antibiotics. The second presentation with worsening symptoms was presumed an adverse drug reaction to cephalosporin antibiotics and underwent cross-sectional imaging for distension and signs of peritonism (guarding). CT scan demonstrated free intra-peritoneal gas with loculated inter-loop fluid collections; there was evidence of a closed loop small bowel obstruction.

The patient underwent emergency laparotomy and small bowel resection. Faeculent peritonitis was found during this operation. An anastomosis was performed, and the patient was admitted post-operatively to the intensive care unit. The patient was extubated uneventfully the following day, however, inadequate analgesia of presumed post-operative aetiology, required insertion of TAP catheters by an anaesthetist.

The patient was discharged to the ward on Day 3 with persistent vomiting and worsening pain. Despite this, the patient's diet was upgraded to free fluids. On Day 4, the notes provided reflect worsening abdominal distension and tachycardia (HR 114) associated with dyspnoea and a labile blood pressure. Also noted was increased discharge from the laparotomy wound. A medical review followed; a diagnosis of hospital acquired pneumonia possibly with an element of fluid overload was made. Diuretics and antibiotics were commenced. Worthy of note were a persistently low albumin (15), rising c-reactive protein test (CRP 307) and leukocytosis (WCC 16.1). Further surgical review was sought later that day from concerned nursing staff who observed the wound discharge to be 'brown'.

An urgent CT scan was performed which demonstrated fluid and gas adjacent to the anastomosis suggesting anastomotic leak. The leak appeared in communication with the anterior abdominal wall. There were multiple intra-abdominal collections suggestive of abscesses. The patient returned to theatre where an anastomotic leak resulting in four-quadrant peritonitis was found. The anastomosis was resected, and an attempt made to fashion a de-functioning stoma in both right and left upper quadrants. The bowel, however, was too oedematous to deliver through the abdominal wall trephine owing to mesenteric oedema. The decision was made to re-perform an anastomosis despite increasing intra-operative inotrope requirements. The patient was transferred to ICU with a laparostomy. On arrival the decision was made to transfer the patient to a higher level of care given their high vasopressor requirement and ongoing haemodynamic instability.

Three days later (Day 9), the patient underwent a re-look laparotomy at Hospital B. The small bowel anastomosis was described as being 'intact'; abdominal lavage was performed, and the patient returned to ICU with a laparostomy. Limited clinical improvement was made over the following four days. On Day 13, bile-stained fluid was noted in the VAC cannister. The patient returned to theatre where dehiscence of the anastomosis was identified.

In addition, there was a leak from a small bowel enterotomy located 20 cm from the DJ (duodenojejunal) flexure. A second opinion was sought from another surgeon to assist with decision-making. Consideration was given to a proximal jejunostomy, however, the morbidity associated with a potential high-output proximal stoma was thought to be too high. The decision was made to resect the anastomosis, re-join the small bowel and to over-sew the enterotomy. A family meeting was held following this to outline the futility of further surgery should these attempts fail.

On Day 19, enteric fluid was found in the VAC cannister indicating ongoing enteric leak. The patient was transitioned to comfort care measures and extubated the following day. The patient rapidly deteriorated and died shortly thereafter, three weeks after initial admission. The cause of death was overwhelming intra-abdominal sepsis.

Areas of good practice / Areas of consideration

This case required expeditious emergency management given the delayed diagnosis of a closed loop small bowel obstruction in a moderate risk operative candidate. Findings at initial laparotomy suggested significant intra-abdominal sepsis. As the patient's physiology improved markedly following resection of the affected segment of small bowel primary anastomosis was reasonable. However, the slow post-operative recovery and abnormal clinical signs, combined with rising inflammatory markers, should have led to a high index of suspicion for a complication, such as an anastomotic leak. Serous discharge from the midline wound in a patient whose recovery varies from predicted often heralds an intra-abdominal complication, which should prompt further investigation.

Rapid surgical intervention was appropriate having CT evidence suggestive of anastomotic leak. The decision to fashion a de-functioning stoma was appropriate, especially in the setting of intra-operative physiological instability and increasing vasopressor requirement(s). While it is understandable that difficulty may have been encountered with delivering oedematous small bowel through the abdominal trephine, techniques such as scoring the small bowel mesentery, mobilising the root of the mesentery, or de-functioning further proximally could have been attempted.

Unfamiliarity, or discomfort, with attempting these manoeuvres could have prompted a second intra-operative opinion from a more experienced colleague, or discussion with a tertiary referral centre, on how best to proceed. Resecting the anastomosis, leaving the bowel in discontinuity, and transferring to a higher level of care would also have been an appropriate option under such circumstances.

Consideration too could have been given to resecting the incidental enterotomies as the degree of intra-abdominal sepsis and expected malnutrition / hypoalbuminaemia associated with both degree and duration of illness suggests oversewing these to be futile.

The discovery of a leaking enterotomy 20 cm from DJ flexure by the second treating team highlights the importance of accurate and clear documentation, particularly in patients who require transfer of care to another surgeon at another institution. It is clear from the notes provided for review that the patient's condition continued to deteriorate. Formation of a stoma 20 cm distal to the DJ flexure would have resulted in markedly abnormal electrolytes and fluid shifts, which would have only worsened the overall clinical situation. The decision made regarding the futility of this procedure, and any others, under such circumstances was felt appropriate.

Learning Points

The main issues arising from assessment of this case are related to:

1. Prompt assessment, investigation, and management of a patient whose post-operative signs and biochemistry aren't as expected for their recovery, particularly in a patient who has significant co-morbid conditions and in whom the diagnosis and management have been delayed.

2. A de-functioning stoma could be performed in a patient who has an anastomotic leak resulting in overwhelming intra-abdominal sepsis. Where this proves challenging, further intra-operative manoeuvres should be employed to facilitate delivery of the bowel through the anterior abdominal wall. Unfamiliarity with this could prompt the early involvement of more senior/experienced colleagues, particularly if the patient is to be transferred to a higher level of care post-operatively. An anastomosis is debatable in the setting of overwhelming intra-abdominal sepsis or in a physiologically unstable patient with high inotrope requirement. One alternative would be to resect the leaking anastomosis, leaving the bowel in discontinuity, and transfer to a higher level of care where subspecialty services are available.

3. Documentation of all intra-operative findings is critical, particularly when the patient is to be transferred and requires further operative management. Direct consultant-to-consultant communication facilitates rapid and accurate dissemination of information.

4. Nutritional optimisation is critical to recovery; early involvement with a dietitian and provision of supplemental nutrition is vital.

Additional reflection from the operating surgeon

In hindsight, discussion about limitation of care between clinicians, patient and family can prepare for a possible poor prognosis, if there was a need for repeat surgery.

CASE 14 - GENERAL SURGERY

Scenario: Patient brought in by ambulance and presented to Emergency somewhat confused with non-specific abdominal pain, lactic acidosis and visibly distended abdomen.

Background: The patient aged in their early 70s with a limited medical history. Several previous spinal operations may have limited movement and complicated vomiting.

First Line Assessor's comment on reading the Surgical Case Form

- Was a CT abdomen going to significantly alter clinical management?
- It appears that the abdominal CT scan was arranged prior to surgical consultation/review, but under whose supervision or instruction?

PEER REVIEW REPORT

Sequence of events

Ambulance Officers shocked the patient, with a systolic of 59, after 500mls of Hartmann's en-route to hospital. During 2-3 days prior to admission, the patient had some vomits, no bowel movements, and was uncertain if passing flatus. Lactate of 9, pH - 7.3.

Urgent CT scan was organised, which would be standard practice. The patient started to desaturate whilst lying flat, despite being on a non re-breather mask. On arrival to CT the patient started to vomit whilst sitting up and then had a large aspiration (about 1-3 litres), followed by 20 minutes of resuscitation with pulseless electrical activity (PEA). The patient was intubated and NGT was inserted with 1.6L initial aspirate.

Post arrest assessment by surgical registrar showed large incarcerated inguinal hernia, firm to touch. CT showed small bowel obstruction secondary to right inguinal hernia with no evidence of ischaemia.

At this stage patient was in ICU ventilated FiO2 100% with 85% saturations, 20ml/hr double strength noradrenaline, adrenalin and vasopressin. Bronchoscopy showed multiple areas of soiling of the tracheobronchial tree. ICU/anaesthetics suggested patient is unstable for surgery and will require further resuscitation. The patient remained on ventilation and dialysis.

The massive aspiration event led to multi-organ failure and death (4 days later), despite care in ICU. The operation and its timing did not contribute to the patient's death.

Areas of good practice / Areas of consideration

The patient had several previous spinal operations which may have limited their ability to roll on their side or to bend forwards. At the time of the aspiration the patient was sitting up - but perhaps not sitting up, or sitting forward, enough.

There is no documentation of analgesia being given to the patient, which may have contributed to drowsiness and a decreased gag.

Sudden large vomits and aspiration causing death is not uncommon and is seen post-operatively, generally associated with ileus and opiate analgesia, or in patients who can't mobilise quickly enough to get into a position to vomit safely.

Learning Points

Clinical awareness of the risk of not being able to vomit safely, in a patient with a distended abdomen should be emphasised.

Either on clinical grounds, or after an initial erect or nurse-supervised supine Abdominal x-ray, a prophylactic NG tube should be considered before a patient is placed into a position where they can't vomit safely. Placing an NG tube can precipitate a large vomit and needs to be done with the patient sitting up close to 90 degrees.

CASE 15 – UROLOGY & GENERAL SURGERY

Scenario: Patient admitted for elective transurethral resection of a bladder (TURB) due to recurrent urothelial cancer.

Background: The patient aged in their early 80s on warfarin with an history of mechanical valve replacement (MVR), coronary artery graft surgery, severe aortic stenosis, atrial fibrillation (AF), ischaemic heart disease (IHD), cerebrovascular accident (CVA), chronic kidney disease (CKD), hypercholesterolemia, Hashimoto's thyroiditis.

First Line Assessor's comment on reading the Surgical Case Form

- The Urologist raises concerns that the use, method, and appropriateness of perioperative coagulation may have contributed to the patient's death.

PEER REVIEW REPORT

Sequence of events

This patient with significant co-morbidities would be considered high-risk for any surgery. Left laparoscopic nephroureterectomy (NU) two years earlier, required laparotomy to control post-operative haemorrhage. Following this surgery there were multiple bladder recurrences and haematuria requiring cystoscopy and washout.

This admission the patient underwent elective cystoscopy and bladder resection. Histopathology demonstrated recurrent low-grade urothelial carcinoma. Surgery was complicated by a suspected bladder perforation and intraperitoneal fluid collection.

Laparotomy was performed on post-operative Day 3, resulting in multiple enterotomies, one of which required bowel resection. No bladder perforation was identified.

Over the next three weeks the patient experienced issues with anticoagulation, bleeding and sepsis, with evidence of intra-abdominal / intra-luminal bleeding on IV heparin. A second laparotomy was performed where ischaemic gut was found with extremely dilated and ischaemic looking loops of small bowel with clots surrounded by very dense adhesions. Further clinical decline with multi organ failure necessitated palliation, with the patient passing away, after extubation, two weeks later.

Areas of good practice / Areas of consideration

The depth of resection was noted at operation and a high suspicion for perforation allows for early recognition of this complication. If catheter blockage was noted, potentially a relook cystoscopy and washout with diathermy may have been considered with consultation with physician to reduce anticoagulation.

Learning Points

1. Significant patient co-morbidities must be considered in decision making as there is a narrow margin for any complications in such cases.

2. While the surveillance of transitional cell cancer (TCC) is necessary, the depth of resection performed may have been deeper than required in this clinical setting.

3. The need for therapeutic anticoagulation post-operatively necessitates rapid bladder irrigation, as bleeding was to be expected. This can lead to fluid extravasation.

Additional reflection from the operating surgeon

In retrospect, the correctable factor could possibly be the issue of catheter irrigation and extravasation, which in this particular anatomy, allowed seepage into the peritoneum in the absence of an actual surgical bladder perforation.

CASE EXAMPLES 16 & 17

These two cases were selected for their educational value to other surgeons as examples of (1) a rare surgical condition and (2) an uncommon complication. The CHASM Committee hopes you find value in these examples and thanks the second line assessors for their excellent contributions.

EXPERIENCES OF PROVIDING CARE – RARE SURGICAL CONDITION - *Gas Gangrene of the Rectus Abdominis Muscles*

CASE 16 – GENERAL SURGERY

Scenario: Patient undergoing systemic chemotherapy for an advanced haematological malignancy developed an acute, severe, rare surgical condition.

Background: A patient aged in their early 70s, with relapse of acute myeloid leukaemia (pancytopaenia), was critically immunosuppressed and haematologically compromised.

First Line Assessor's comments on reading the Surgical Case Form

- Earlier surgical referral may have afforded an opportunity to debride the rectus/myonecrosis/gas-gangrene, however, mortality would always have been high.

PEER REVIEW REPORT

Sequence of events

The patient was admitted to hospital for chemotherapy under a medical specialty, and for four days was tolerating treatment and remained haemodynamically stable and afebrile. On Day 5, the patient developed increasing left upper quadrant (LUQ) abdominal pain. The pain was described as crampy and twisting in nature, not exacerbated by inspiration or with eating, and there was no nausea, vomiting or diarrhoea. On examination a palpable mass was felt, but there was no rebound or percussive tenderness and bowel sounds were present. The impression was splenomegaly with associated potential increase in size causing pain or splenic infarct; a differential diagnosis was haematoma of abdominal muscles. The medical consultant reviewed him later that day and noted no peritonism.

A CT was negative for splenic infarct but showed enlargement of the left anterior and anterolateral abdominal wall muscles with surrounding fluid collection and locules of free gas. It was unclear at this time as to what this signified, possibly a rectus sheath haematoma or infective pathology, however, the impression was possible necrotising fasciitis. He was commenced on oral and intravenous antibiotics. At the time, surgical consult was not planned with agreement to contact the medical consultant, if necessary, overnight. Blood cultures venous blood gases were attended.

At 23:51 hours, the Medical Registrar discussed the case with the Medical Advanced Trainee as the patient's pain remained despite morphine and the registrar enquired whether surgical input was needed along with a repeat abdominal CT. Anaesthetics review for pain management was arranged, but the decision was made not to redo CT scan or attend to a surgical review.

A review by the acute pain service at 01:30 hours noted the patient looked unwell and was in obvious distress. A MET call was activated during the review due to clinical concern and raised respiratory rate, with repeat blood pathology showing elevated lactate. The cause for the acute abdominal pain was unclear and an urgent surgical review was arranged by ICU and a Ketamine analgesic subcutaneous infusion commenced at 8mg/hr, along with morphine PCA and continued intravenous fluids.

The patient was seen by the ASU Registrar one hour later and the suspicion of gas being a necrotizing/infective fasciitis was high. However, as the patient's immune system was supressed, surgical intervention would have a high risk of mortality. The ASU registrar spoke with the in-charge haematologist who agreed to manage non-operatively. The on-call ASU surgeon was also informed of the plan of non-operative management.

A second MET call was made at 03:42 hours for tachypnoea and abdominal pain with guarding. The on-call haematologist noted the patient was not palliative and was for full active medical measures. The plan was: 10mg IV Ketamine bolus x4; SC Ketamine dose was increased to 16mg/hr (from 8mg/hr); Morphine 5mg SC q1hrly, max dose 80mg, and cease PCA. The patient had two units of packed red blood cells (PRBC), 250ml normal saline bolus, and repeat blood pathology after the transfusion.

A third MET call occurred 2.5 hours later with the patient highly agitated, tachypnoea and SpO_2 was 79% with an agonal breathing pattern. Heart rate was 120 and the patient was given 0.5mg Metaraminol IV x 2; Morphine 10mg IV stat; and the Ketamine infusion was ceased. ASU registrar input was sought and transfer to ICU at 06:45 hours for resuscitation. The patient was urgently intubated, resuscitated with PRBC and commenced on noradrenaline.

At the morning ICU ward round the patient was critically unwell, intubated, needing resuscitation for pancytopenia and vasopressor support. Noradrenaline was now up to 5ml/hr and SpO_2 was 98%, chest quiet otherwise, air entry equal and heart sounds dual. Darkened abdominal wall tissue was noted overlying the left side, with extension to flank, and down to the hip. The impression was necrotising myonecrosis, and bedside surgical and medical review was organised for 08:30 hours.

Given the potential diagnosis of necrotising fasciitis, the extent of surgical debridement required with pancytopenia would be un-survivable. A consensus decision was made to perform a diagnostic incision at the bedside.

The ICU team gave the GA with 100mcg Fentanyl, with continuation of Propofol infusion and 100mg Rocuronium. A lateral incision was made down to the abdominal wall and there was immediate evacuation of foul dishwater smelling purulent material. On opening the anterior sheath, pungent gas was released. The rectus muscle was dead and dishwater fluid expressed. Rectus muscle myonecrosis was confirmed. Specimens were sent for MCS. The wound closed and dressings applied.

The plan now was to continue sedation for comfort and dignity and not for escalation beyond current treatment. That evening the patient was extubated, noradrenaline and Propofol infusions stopped, and the Fentanyl infusion continued at the same rate. The patient passed away one hour later with their family at the bedside.

Learning Points

Earlier involvement by the surgical team may have afforded an opportunity (albeit small) of altering this patient's outcome from what is almost universally a fatal condition when seen in this clinical setting.

This case highlights the need for multidisciplinary care co-ordination to improve understanding, treatment and outcomes of gas gangrene in immunocompromised patients.

EXPERIENCES OF PROVIDING CARE – UNCOMMON COMPLICATION – *Atrioventricular (AV) Rupture*

CASE 17 – CARDIOTHORACIC SURGERY

Scenario: Patient admitted for elective mechanical aortic and mitral valve replacements and scheduled as the first case of the day.

Background: A patient aged in their late 60s, with established atrial fibrillation and on warfarin, diagnosed with severe rheumatic mitral stenosis and significant mixed aortic valvular disease.

First Line Assessor's comments on reading the Surgical Case Form

- Why was the salvage repair of the AV dehiscence not attempted? The patient was relatively young with no documented co-morbidities and the admission was elective.

The repair of the defect is possible, but with a well-recognised high failure rate. The decision to not proceed to repair is often made in a patient with significant co-morbidities when it is considered futile.

PEER REVIEW REPORT

Sequence of events

The patient presented with a six-month history of gradually decreasing exercise tolerance. Other than for several other general surgical procedures in the past, the only other significant issue was a cerebral event, some ten years previously, from which the patient had made a good recovery and was reported to have only mild residual symptoms.

The surgery proceeded along well-established lines employing cardiopulmonary bypass and cardioplegia to arrest the heart. The investigatory findings were confirmed on inspecting the valves visually and both the mitral and aortic valves replaced with mechanical prostheses. Surgery was uneventful with no technical difficulties reported. The patient was weaned from bypass with minimal support. Intraoperative transoesophageal echo reported good ventricular function with both valves functioning satisfactorily on completion of the procedure and weaned from bypass. The chest was closed in a routine fashion and the patient was prepared to be transferred to the ICU.

At the end of the procedure, prior to transfer from the operating room to intensive care, the patient became profoundly hypotensive with significant bleeding from the chest drains. Resuscitation was commenced, including CPR, and the sternotomy reopened in an emergent fashion. Blood was seen to be coming from the back of the heart constantly welling up in the pericardial cavity and no bleeding from the surgical suture lines. This is the hallmark feature of an AV disruption, an uncommon but catastrophic complication of mitral valve replacement.

Areas of good practice / Areas of consideration

The case is well documented with the correspondence between the referring medical practitioners and the hospital all available and easily followed. The operation report was detailed and the processes on reaching the decision not to reoperate documented.

Learning Points

The surgical team was faced with a difficult decision. To repair the defect is an enormous task which involves the removal of at least the mitral valve and most likely the aortic valve, repair the defect with a patch, and possibly grafting the circumflex coronary as the sutures placed to repair the defect may ensnare the artery in the AV groove. The valves would then need to be reinserted. The mortality for this reoperation is reported to be up to 75% in some series. The surgical team is faced in a difficult position knowing that the patient will most likely die no matter what decision is made.

If there was a case to be made for proceeding to attempt to repair the defect, it would be that the patient was relatively young and without major co-morbidities, there were no technical difficulties associated with the valve replacements and the patient was still in the operating theatre. However, one needs to consider that more than likely not only the mitral valve but also the aortic valve would need to be re-replaced.

This is a rare and difficult situation and the decision on how to proceed would have to be left to the operative team.

Bringing kindness and compassion into care.

The following case is an example of excellent patient-centred care in a challenging situation. It also provides an opportunity to introduce the revised end-of-life guidance developed by the Sydney Children's Hospitals Network.

CASE 18 – PAEDIATRIC CARDIOTHORACIC SURGERY

Scenario: Neonatal patient born at Hospital A (Day 0) with suspected cyanotic congenital heart disease. Transferred to Hospital B where diagnosis was confirmed with balloon pulmonary valvotomy scheduled for the following day.

Background: A full-term neonate experienced post-natal desaturations associated with a grade 3-4/6 pan-systolic murmur throughout the praecordium. There was a maternal history of diabetes and prolonged rupture of membranes with prescribed antibiotics.

First Line Assessor's comment on reading the Surgical Case Form

- Review cardiac surgical procedure to see whether any adverse events occurred that would explain necrotising enterocolitis developing.
- Review notes to determine contraindication for laparotomy. Coagulopathy noted, however, laparotomy with blood product cover is likely to have been the only intervention that might have prevented death. If the neonate was well enough for cardiac surgery five days prior, then overall condition prior to this event must have been reasonable.

PEER REVIEW REPORT

Sequence of events

The neonate was suspected of cyanotic congenital heart disease following desaturations associated with a grade 3-4/6 pan-systolic murmur throughout the praecordium. Retrieved by NETS NSW[4] to Hospital B, the diagnosis was confirmed by Echocardiography on Day 1 [PV (pulmonary valve) stenosis, persistent PDA (patent ductus arteriosus), suprasystemic RVSP (right ventricular systolic pressure), Tricuspid dysplasia and restriction septal leaflet, PFO (patent foramen oval) and right ventricular hypertrophy].

The following day (Day 2) the neonate was taken for cardiac catheterisation by an interventional cardiologist which confirmed the diagnosis. A balloon pulmonary valvotomy was performed in an attempt to improve the neonate's cardiac condition.

Subsequently, the neonate was reasonably stable until the early hours of the Day 7 (normal respirations, tolerating full gastric feeds, warm and pink and not in any pain). The nursing staff and junior medical staff raised concerns late on Day 6 regarding hypothermia and increasing respiratory distress with poor colour and perfusion. A decision was made to transfer the neonate to ICU for respiratory support. However, the neonate continued to deteriorate rapidly (02:00 hours on Day 7) with abdominal distension, worsening respiratory function and the onset of organ failure (pH 6.7, K+ 7.5, INR / PT and aPTT were undeterminable with low fibrinogens).

The diagnosis of necrotising enterocolitis was made on the basis of abdominal distension, fullness on the right side with an abdominal x-ray demonstrating a gasless abdomen and pneumatosis intestinalis in the right lower quadrant. This was further substantiated by an abdominal ultra-sound confirming the abdominal x-ray findings.

The neonate was intubated, ventilated and supported with inotropes (dobutamine and adrenaline and later dopamine) in an effort to improve cardiac function. In addition, blood products (including FFP, cryoprecipitate, platelets and packed red cells) were administered in an attempt to correct the neonate's disseminated intravascular coagulopathy (unsuccessful). Sodium bicarbonate was given to correct their profound acidosis, but to no avail. The neonate developed anuric renal failure.

[4] https://www.nets.org.au/ The Newborn & paediatric Emergency Transport Service is a state-wide service of NSW Health; hosted by the Sydney Children's Hospitals Network. It is the only service of its kind in Australia.

The ICU personnel, cardiologists and surgeons concluded that the neonate had multi-organ failure in the context of severe necrotising enterocolitis (NEC)[5], and despite maximal therapies was not considered stable enough to survive surgical intervention.

A Natural Death Plan[6] was developed in consultation with the family and senior staff by 21:31 hours on Day 7. The neonate went on to develop seizures and pulmonary haemorrhage, and a decision was made to redirect care with the neonate extubated at 13:27 on Day 8. The neonate passed away peacefully later that day in their mother's arms, and in the presence of their father and maternal aunt.

Documentation

In the notes there is evidence of nursing, medical and social work consultation, and support throughout the admission. Consent for procedures and decision is documented. The notes reveal that every effort was made to treat the condition and when further treatments were judged to be futile this was discussed with the parents and a shared decision made. There is documentation relating to extensive peer consultation and discussions with the parents as to the futility of further treatment following the rapid deterioration and failure to respond to life-prolonging intervention.

Areas of good practice / Areas for consideration

The condition was recognised and an appropriate response with retrieval to a tertiary facility occurred in a timely manner. Cardiac assessment was comprehensive and appropriate intervention was carried out without incident. The neonate went on to develop multi-organ failure from NEC in the context of underlying cardiac defects (a known association/risk). This was fulminating, and despite evidence of extensive treatment efforts, the neonate failed to respond.

The parents were consulted about the risks of further intervention and the likelihood of death, or in the event of survival the possibilities of significant neuro-developmental consequences. They were given support to make their decisions as evidenced by the development of the natural death plan. The neonate's death occurred in the presence of the parents and family members and there is evidence of ongoing support following this bereavement.

In terms of the decision not to undertake a laparotomy for NEC, this appeared to have occurred with the understanding that failure to respond to therapy was likely. Indeed, the disseminated intravascular coagulopathy and organ failure was such that surgery would have increased the risks, including the possibility of death in the operating theatre. It was reasonable to discuss these risks and likely outcomes with the parents and support them to make decisions regarding their child.

Learning Points

The crucial nature of including and informing the family in treatment options and decisions.

Provision of support when ceasing active interventions and ongoing bereavement support.

Reference

This case example refers to "A Natural Death Plan" which forms part of the Guideline: *Palliative Care for Inpatients*, implemented in 2013. Since then, the Sydney Children's Hospitals Network has done considerable work with end-of-life care guidance, producing *The Last Days of Life: Paediatric and Neonatal Toolkit* in 2022[7].

This toolkit recognises the human experience and best practice interventions required to ensure the patient and family remain the central focus leading up to a death of a child. It also helps to empower clinicians to partner with patients and families, providing them with increased knowledge and confidence to transform the experience of a child dying. The toolkit was a collaboration between different Health Services and included lots of different disciplines and involved patient's families. The initiative recently won a NSW Health Award for the criteria: *Transforming Patient Experience*.

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[5] https://www.ncbi.nlm.nih.gov/books/NBK513357/ Ginglen JG, Butki N. Necrotizing Enterocolitis. [Updated 2022 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-.
[6] https://www.schn.health.nsw.gov.au/_policies/pdf/2013-9075.pdf Guideline: Palliative Care for Inpatients.
[7] https://www.schn.health.nsw.gov.au/_policies/pdf/2022-129.pdf Guideline: Last Days of Life Toolkit.

Partnering with patients to make decisions about their own care.

This case is an example of person-centred care where the patient had set clear goals about their current and future care in respect of their religious views. While it may be challenging for some clinicians to accept such absolute viewpoints, it is important to understand how honoring the *decisions a patient makes* may affect the way in which usual care is delivered when faced with an uncommon predicament.

CASE 19 – GYNAECOLOGY

Scenario: Patient pre-admitted two days prior to elective surgery at Hospital A. Vaginal hysterectomy, anterior vaginal wall repair and posterior wall repair/perineorrhaphy were performed on Day 3. Transferred to Hospital B on Day 4 due to bleeding complications.

Background: An obese patient aged in their mid-70s on a background of Ischaemic Heart Disease (3 x Coronary Artery Grafts approximately a decade ago), coronary artery stenosis (confirmed by angiogram), Type 2 diabetes, hypertension and significant procidentia[8].

First Line Assessor's comment on reading the Surgical Case Form

- What was the pre-operative discussion? Risks / Options?
- Post-operative management – should surgery have been conducted in an institution that appears not able to manage post-operative haemorrhage?

PEER REVIEW REPORT

Sequence of events

The patient was a practicing Jehovah's Witness who lived with their spouse. They had no known allergies and did not smoke or drink alcohol. Medications included Metformin, Metoprolol, Ezetimibe, Pravastatin, Novomix 30 and low dose aspirin.

The pre-operative gynaecology assessment was not included in the medical notes provided, but the pre-admission review included a visit to an endocrinology clinic and assessment by an anaesthetic registrar. Of note, there was a consent for vaginal hysterectomy, vaginal repair and sacrospinous fixation, which did not include consent to blood transfusion. Approximately 6 weeks prior to admission, a document was completed outlining the patient's non-acceptance of blood products.

The patient was pre-admitted 2 days prior to the surgery date for packing of the vagina to minimise ulcerations within the vaginal tissue and to optimise diabetes management. During the course of these days, the patient was reviewed by medical staff on several occasions due to the pack falling out.

The operation took place on the scheduled day and was approximately 90 minutes in duration. The operative report was standard with an estimated blood loss of 250 mls. Nothing unusual was noted during this time.

In recovery there were significant issues. It was noted that blood pressure was low (55/31) and treatment with ephedrine and metaraminol was instituted. The patient also became significantly bradycardic with a heart rate of 33. Presumably in response to treatment, the blood pressure became significantly elevated with a systolic blood pressure climbing to 215 at one point. The patient was appropriately reviewed by junior and senior staff, both anaesthetic and gynaecology teams reviewed, and was appropriately assessed for bleeding early on with a pack removed and Hb checked. A Hemocue® assessment suggested a Hb of 110 approximately 2 hours post-operatively. A bedside ultrasound at this point suggested a haematoma might be present, so CT was requested to confirm. The team also confirmed with the family that the patient *would not* consent to blood products during this time.

[8] https://www.ncbi.nlm.nih.gov/books/NBK542211/ Doo J, Khandalavala J. Procidentia. [Updated 2022 Jul 11]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-.

CT scan confirmed a moderate pelvic haematoma measuring 92x87x96mm. The team liaised with Hospital B ICU for transfer to them for consideration of further management in a tertiary referral hospital.

The blood pressure remained high and with ICU involvement, including direct consultation with Hospital B intensivists, it was decided to defer transfer until a surgical attempt was made at Hospital A to control the bleeding. Management of the hypertension continued using hydralazine, ramipril and fluid boluses of albumin 4%.

The second surgery started after midnight, just over 7 hours after the first surgery. Senior staff were appropriately involved with 2 specialist gynaecologists present. They performed a midline, sub umbilical laparotomy and evacuated approximately 500mls of clot. A small bleeder was found at the vault and sutured. Floseal® was applied to the vault and things were checked vaginally. Further Floseal® was applied to the vaginal vault and the vagina was packed. A check cystoscopy was performed. Total estimated blood loss was 1000mls.

The patient was then transferred to ICU at Hospital B, arriving 2 hours later, still intubated and ventilated. Aramine was being used to maintain the blood pressure, with intravenous tranexamic acid[9] (TXA) and antibiotics given (gentamicin and metronidazole). Hb was 61, potassium 6.1 and glucose 16 at this point.

In ICU, every effort was made to maintain haemodynamic stability. The patient was reviewed by a urologist for a hydroureter which pre-dated surgery. The gynaecology team were involved, and a further CT was performed demonstrating a re-collection of the haematoma, now measuring 71x73x87mm. Haemoglobin hovered in the low 60s, but haemodynamically the patient was hard to control, now needing noradrenaline (double strength) to maintain blood pressure.

During the day a family meeting was held, where family members expressed their frustration about the patient's decision not to accept blood products.

In the early hours of the next day, with increasing noradrenaline requirements, after gynaecology review, for concern regarding the possibility that bleeding was ongoing, an opinion was sought from an interventional radiologist. A further pelvic ultrasound confirmed a haematoma was still present and approximately the same size 77x83x53mm. Interventional radiology thought their input was not warranted.

At daybreak, a senior review occurred between gynaecology and general surgery and a further take back to OT was planned. The third surgery occurred 2 hours later and was 50 minutes in duration. There was only a small haematoma removed and a small amount of ooze seen. Post-operative Hb was 52.

Haemodynamically, the patient remained challenging, so dobutamine and vasopressin were added to the noradrenaline to help maintain blood pressure. The working diagnosis remained haemorrhagic shock and metabolic acidosis.

A family meeting was called to discuss prognosis, management and issues surrounding the refusal to accept blood products. The decision was discussed at a hospital administration and state level. Legal advice was sought, and the patient's wishes clarified and granted.

The patient was placed on dialysis 4 hours post-operatively. Later that afternoon, after a second opinion from another intensivist, with a failing heart and unsupportable haemodynamics the patient's care shifted to palliation. The family were informed, and a Minister of religion was called. Sadly, death was declared 7 hours after the third operation.

[9] **JW perspective:** During certain types of surgery, such drugs as tranexamic acid and desmopressin are often used to increase blood coagulation and lessen bleeding. https://wol.jw.org/en/wol/d/r1/lp-e/101998889?q=bloodless+surgery&p=doc

Additional comments from the second line assessor

Bleeding and vault haematomas are a relatively common occurrence with vaginal hysterectomy and repair. Excessive intraoperative bleeding occurs in up to 2.5% of cases. There was no suggestion of this during this case. Immediately afterwards this patient became haemodynamically unstable and within a few hours the correct diagnosis had been made. I believe that it was reasonable to attempt this routine gynaecological surgery at Hospital A and it seemed to me that the response to a known complication was handled appropriately and in a timely manner. The consultant and team involved all the right resources and moved quickly to correct the problem. The bleeding was diagnosed, the haematoma found and treated accordingly. In the early part of management, no blood products were required because the haemoglobin remained at an acceptable level. Given this patient's non-consent to blood products, I might have suggested early haematology input to help guide appropriate management going forward. I was not sure if this had happened at Hospital A, and probably at that point would have made little difference.

Whilst not a criticism, I wonder if the use of laparoscopy would have been helpful. Certainly, a laparoscopically assisted vaginal hysterectomy may have revealed bleeding sooner and led to its immediate management. This would obviously be dependent on operator skill and the availability of appropriate equipment. Neither of which I am able to comment on. Also, laparoscopy could have been used to assess the haematoma less invasively.

Another point for consideration relates to the management of haemodynamics in recovery. There seemed to be some significant changes here with bradycardia and varying blood pressure, taking some time to control. This may benefit from review by the anaesthetic team.

Overall, it is my view that this patient suffered a well-described complication of an appropriate surgery - post-operative bleeding leading to vault/pelvic haematoma after a vaginal hysterectomy with vaginal wall repairs. Whilst this was the initiating event that ultimately led to death, I feel that this would not have been the outcome if blood products had been instituted early. This, unfortunately, was the patient's pre-determined wish and there was nothing the medical or nursing staff could have done to change this.

Conclusion: I could not find any major deficiencies of care and overall thought the communication between all the teams was of a high standard, including communication with the family.

RECOMMENDATION

The CHASM Committee reviewed this case and discussed some of their own experiences when admitting and treating Jehovah's Witness patients. Overall, the Committee believed that the challenge with surgical intervention was often in the knowledge that these patients are *not to be transfused with blood products*. With this patient preference strongly in focus, it is possible that a clinician may lose the typical routine of treatment when a bleeding complication is recognised.

Further, Jehovah's Witness patients should always be linked in with haematology on admission, even if it is only to prevent an inappropriate transfusion of blood products in situations where the patient is unable to communicate their religious preference.

When planning for elective surgery, it is important to be well-informed on the treatment options that each individual decides would not violate their trained conscience, therefore maintaining 'a good conscience'.[10] These decisions should be clearly documented in the patient's medical record to inform all practitioners involved in the care of the patient throughout their admission.

[10] **JW perspective: Do Jehovah's Witnesses allow the use of autologous blood?** https://wol.jw.org/en/wol/d/r1/lp-e/1989169#h=1:0-22:0

CHASM

COLLABORATING HOSPITALS' AUDIT OF SURGICAL MORTALITY

CHASM DATA

2015-2020

CHASM DATA 2015-2020

Introduction

This section of the report analyses the data (extracted 21/10/2022) over the 6-year period; 1 January 2015 to 31 December 2020. Notification activity relates to the Hospital Groups and the notification of deaths (NODs) submitted to CHASM. A case is created from the notification, and a request is issued to surgeons for information. The request is responded to when the operating surgeon completes a surgical case form (SCF) and submits it via fellows interface.

Notifications – Activity in 2020

A total of 1,731 cases were created in 2020 from the notifications submitted by hospital groups, with 1,268 (73.25%) for deaths occurring in 2020. The average number of monthly notifications for 2020 (n=144) was lower than the average for 2019 (n=172). Comparative data on these notifications is displayed in Figure 1.

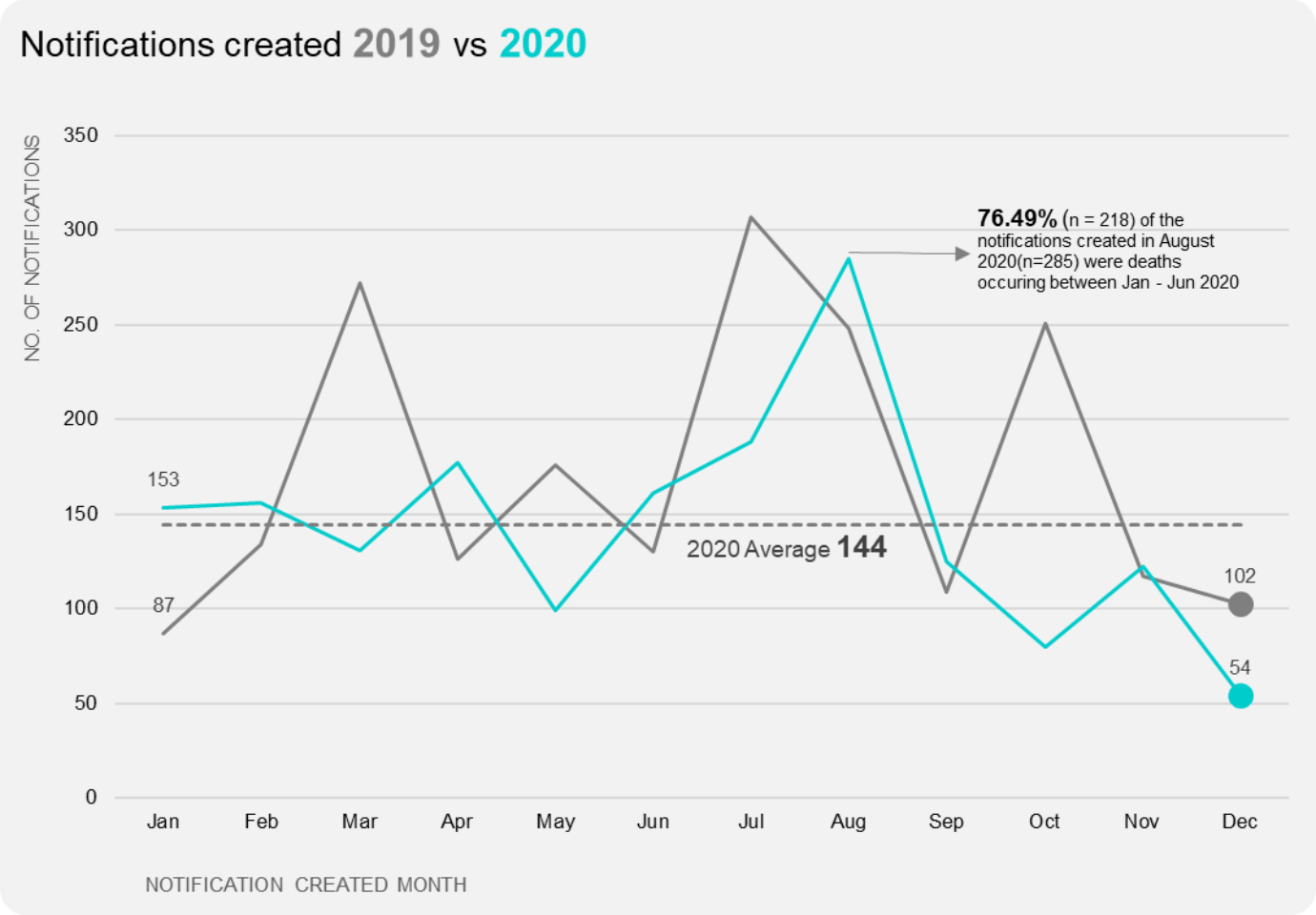

Figure 1: Comparison of notifications created in 2020 (n=1,731) and 2019 (n=2,059).

Note: Notifications of death identified as Excluded–Error and Closed–Non Participant are not included.

When patients are operated on by more than one surgeon over the course of their admission, CHASM will seek input from each surgeon performing an operation. These are referred to as multi-surgeon cases. Over the 6-year reporting period (2015-2020) CHASM created 2,064 (16.95%) multi-surgeon cases.

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The most frequent surgical specialty for notifications created in 2020 was General Surgery. It represented 37.55% (n=650) of notifications, followed by Orthopaedic Surgery with 20.97% (n=363) and Neurosurgery with 16.64% (n=288). Together, these three specialties represented 75.16% (n=1,301) of all notifications, with 74.88% (n=973) of those deaths occurring in 2020, as shown in Figures 2 and 3 below.

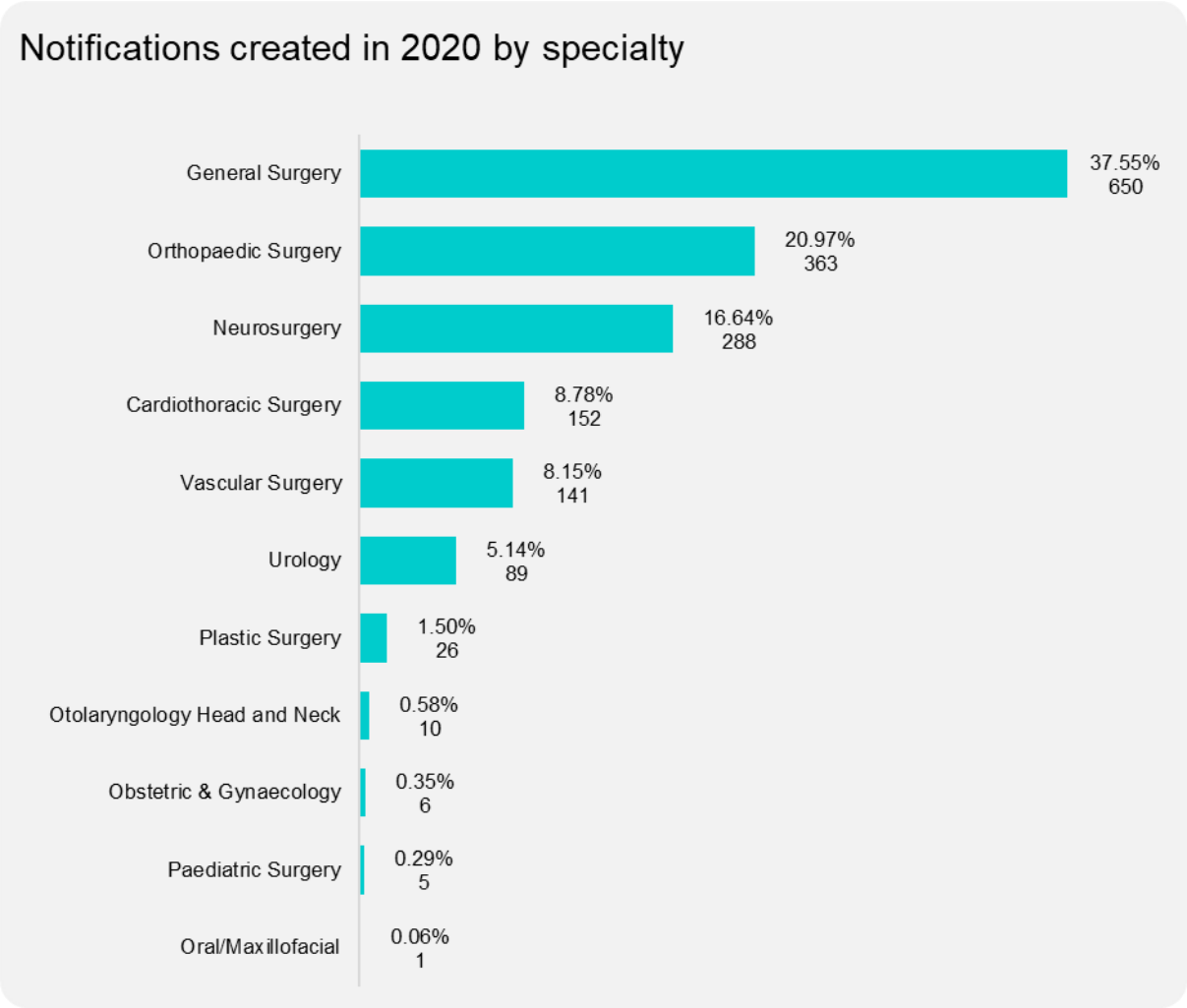


Figure 2: Notifications created by specialty in 2020.

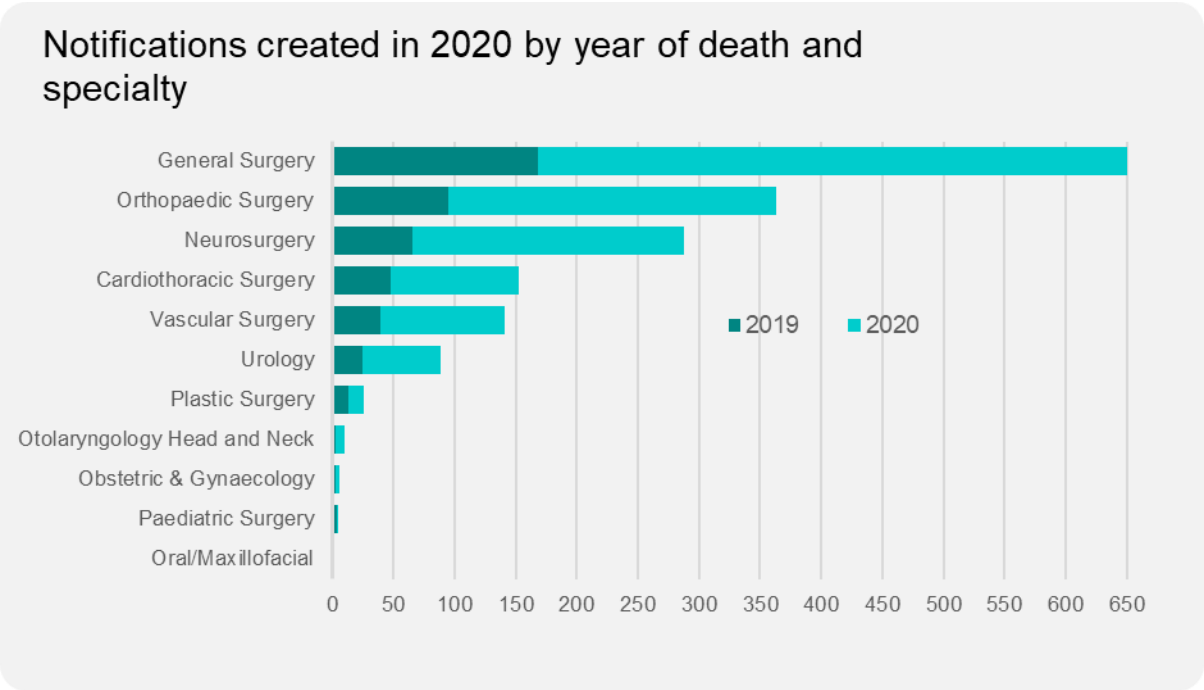


Figure 3: Notifications created in 2020 by year of death and specialty.

Annual Trend Data 2015-2020

Up to and including 21 October 2022, a total of 12,878 notifications were created for the 6-year reporting period, as shown in figures 4 and 5. The highest number of notified deaths to CHASM occurred in 2017 (n=2,307) and the lowest in 2018 (n=1,953).

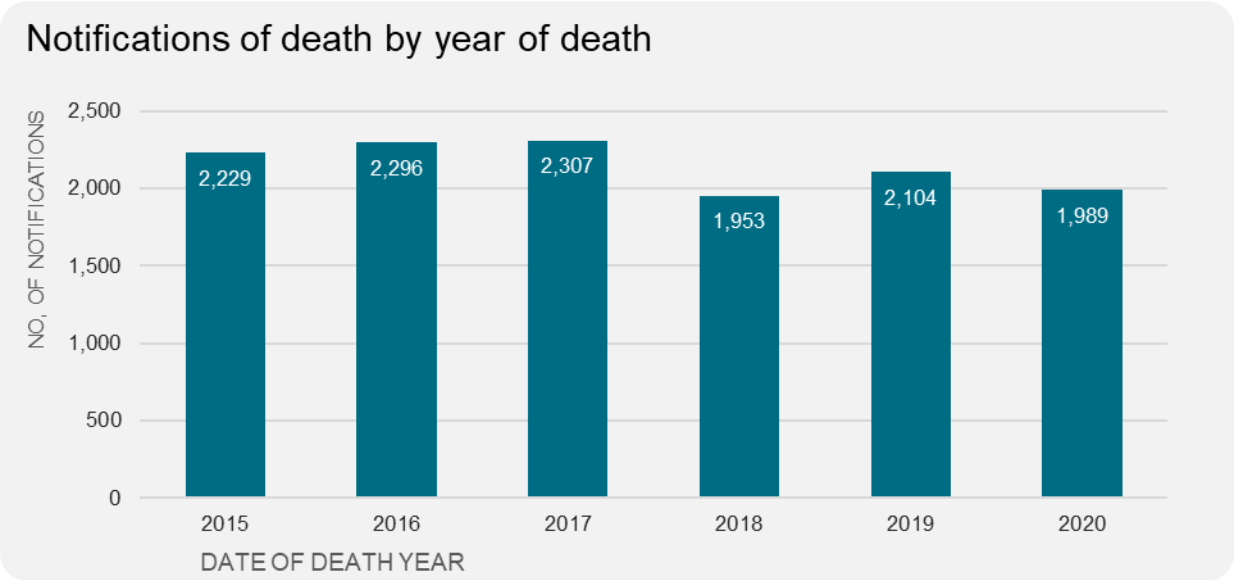


Figure 4: Distribution of notifications created by year of death over the 6-year period (2015-2020).

Note: Notifications of death identified as Excluded–Error and Closed–Non Participant are not included

The months of May (n=241) and July (n=239) in 2015 had the highest number of deaths, similarly July 2017 (n=221) was above the upper control limit (n=218).

February 2018 (n=122) and December 2019 (n=131) had the lowest number of deaths below the lower control limit (n=138).

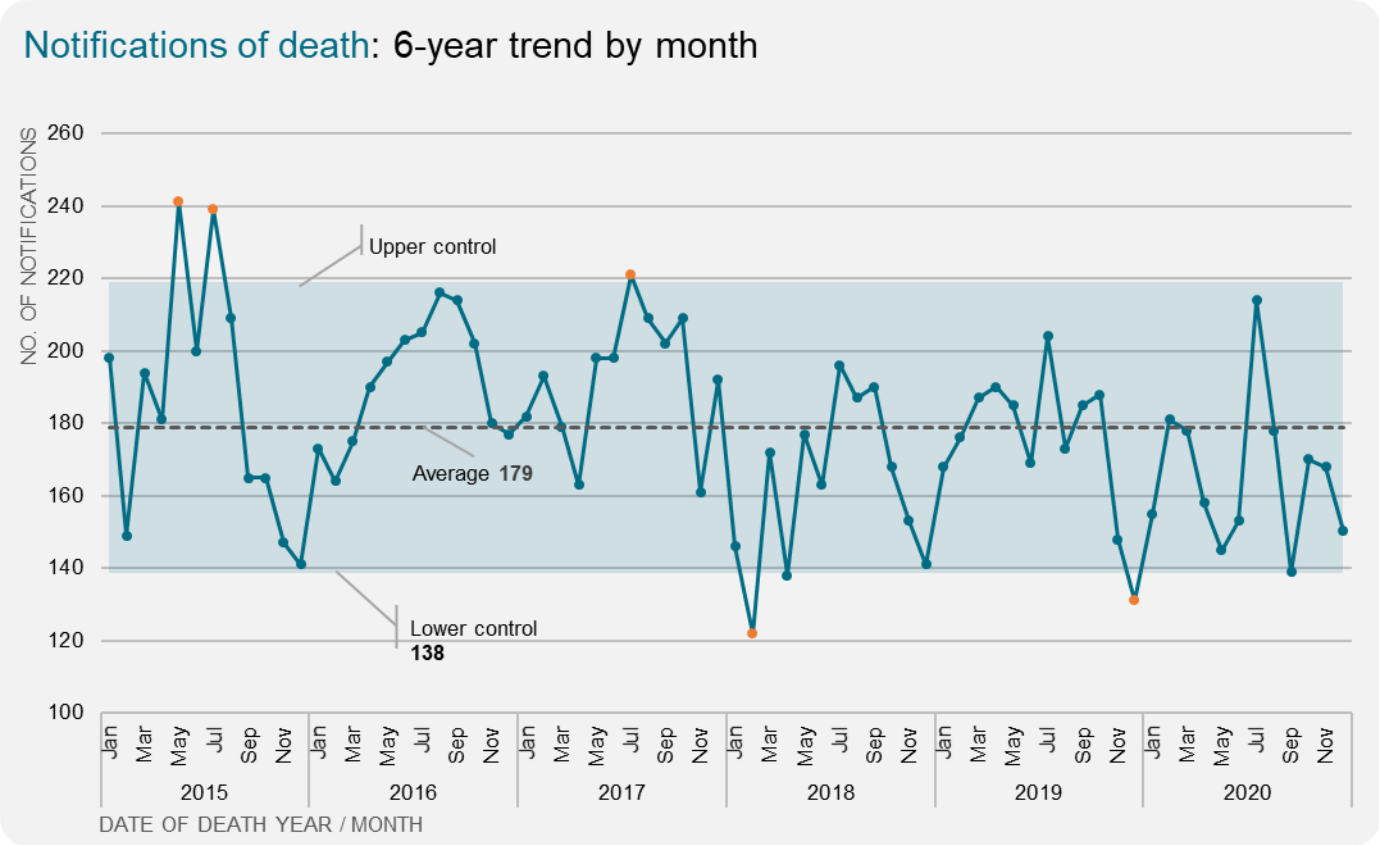


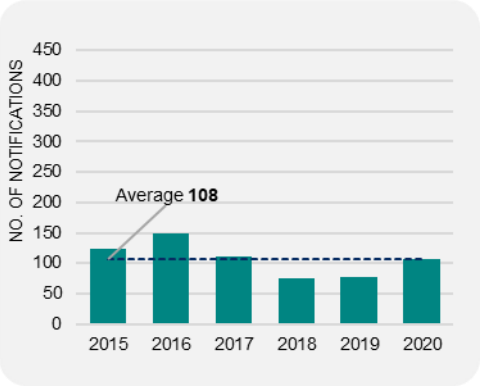
Figure 5: Distribution for notifications created by month over the 6-year period (2015-2020).

Hospital Group Trend Data 2015-2020

As noted, CHASM received 12,878 notifications of death from Hospital Groups between 2015 and 2020. Figure 6 spans pages 55 and 56 and shows the distribution of deaths notified to CHASM by Hospital Group for each year of the reporting period. Hunter New England Local Health District recorded the highest number of notifications of death (n=1,969) and Far West Local Health District recorded the lowest (n=34).

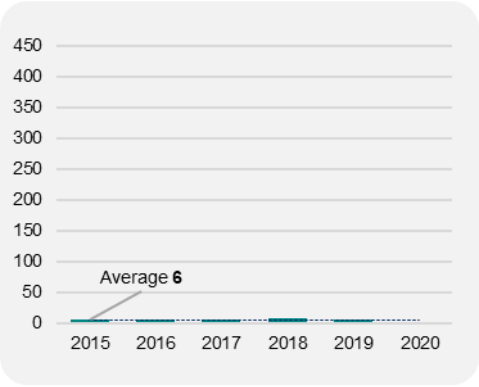
CCLHD

Total Notifications 646



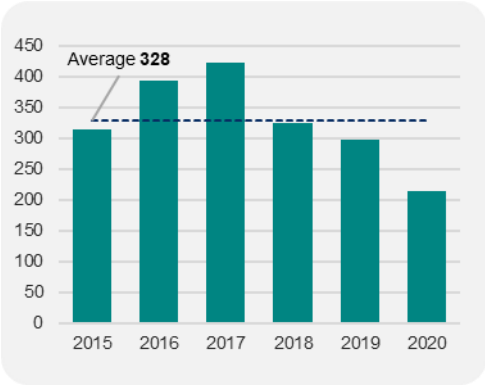
FWLHD

Total Notifications 34



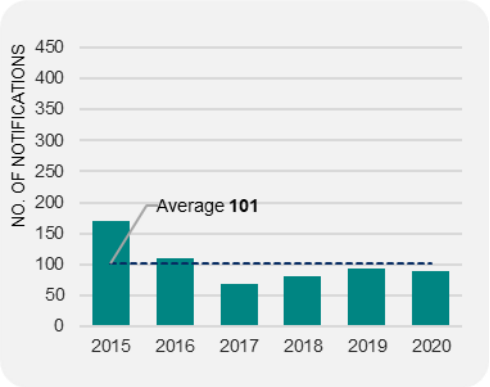
HNELHD

Total Notifications 1,969



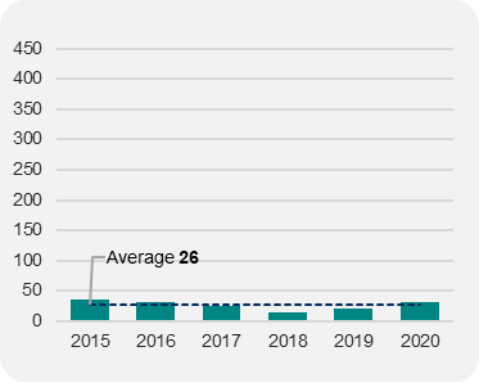
ISLHD

Total Notifications 607



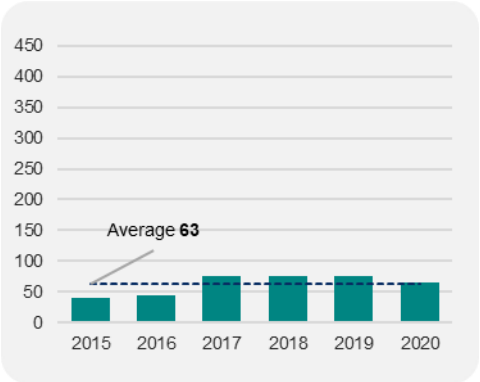
MLHD

Total Notifications 158



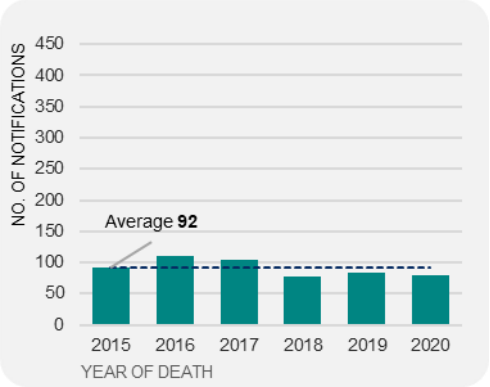
MNCLHD

Total Notifications 377



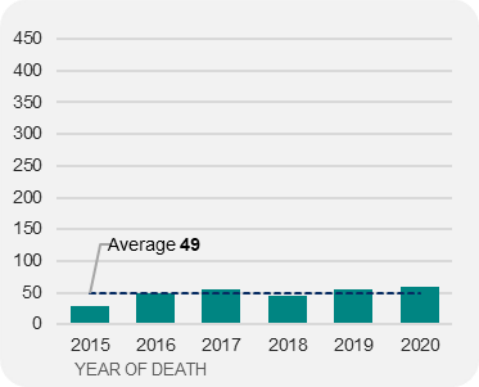
NBMLHD

Total Notifications 550



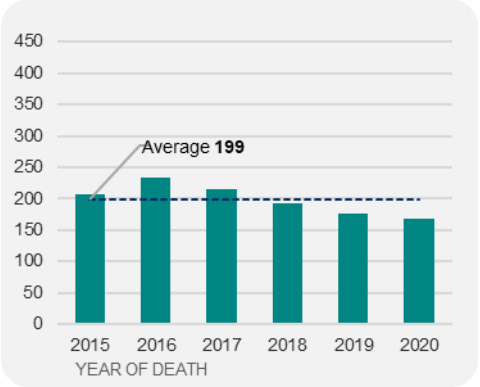
NNSWLHD

Total Notifications 294

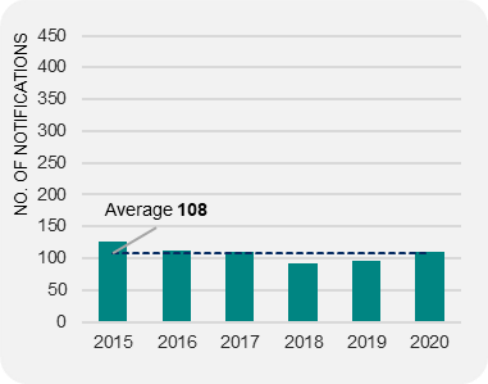


NSLHD

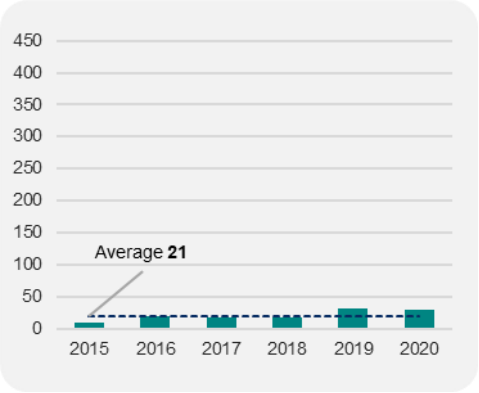
Total Notifications 1,193



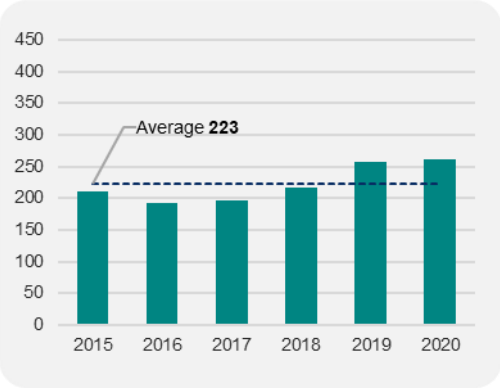
Private Hospitals
Total Notifications 649



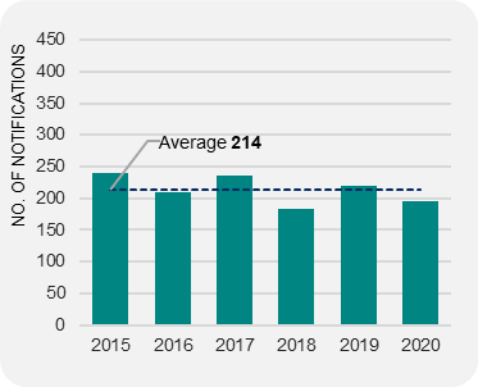
SCHN
Total Notifications 125



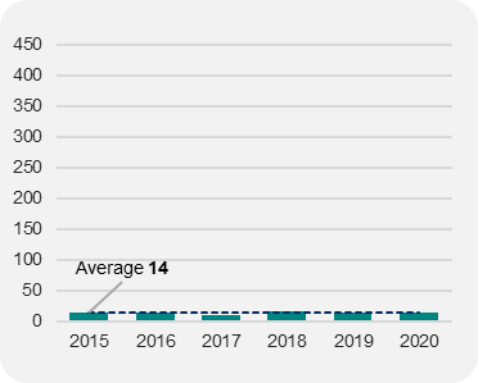
SESLHD
Total Notifications 1,336



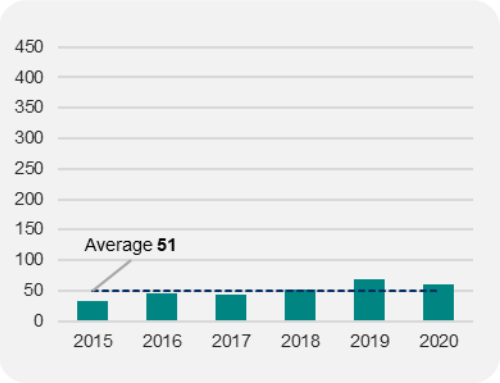
SLHD
Total Notifications 1,284



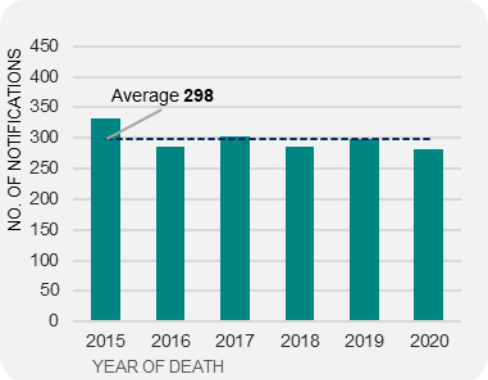
SNSWLHD
Total Notifications 84



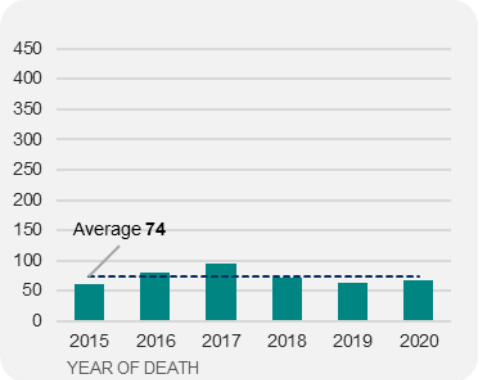
SVHN
Total Notifications 303



SWSLHD
Total Notifications 1,785



WNSWLHD
Total Notifications 442



WSLHD
Total Notifications 1,042

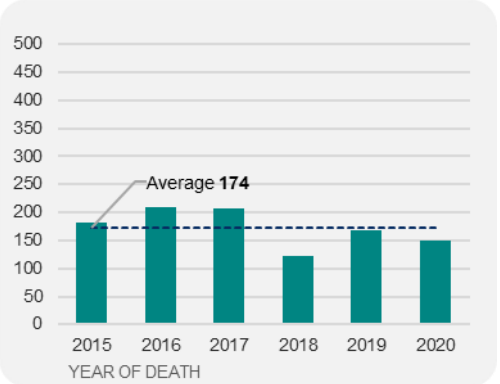


Figure 6: Distribution of notifications by Hospital Group and date of death for the 6-year period (2015-2020).

Age Band and Gender Data 2015-2020

Figure 7 shows that of the total number of notified deaths over the 6-year period, 55.36% were male patients and 44.64% were female. The median age for male deaths were 52.5 years and female were 53.5 years.

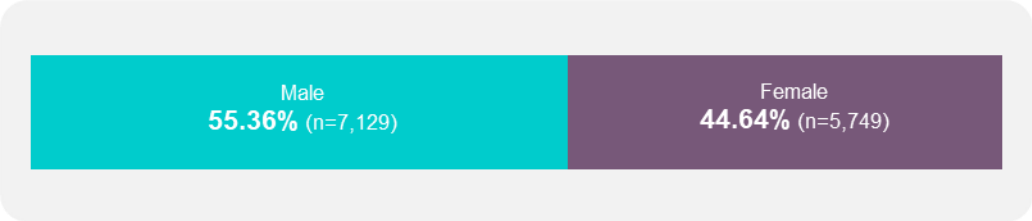


Figure 7: Gender comparison for deaths in 2015-2020.

Of the 12,878 deaths, 80.45% occurred in patients aged between 60-94 years of age (n=10,360), as shown in Figure 8 below. Patients aged from 40 to 99 years account for 95.12% of notified deaths.

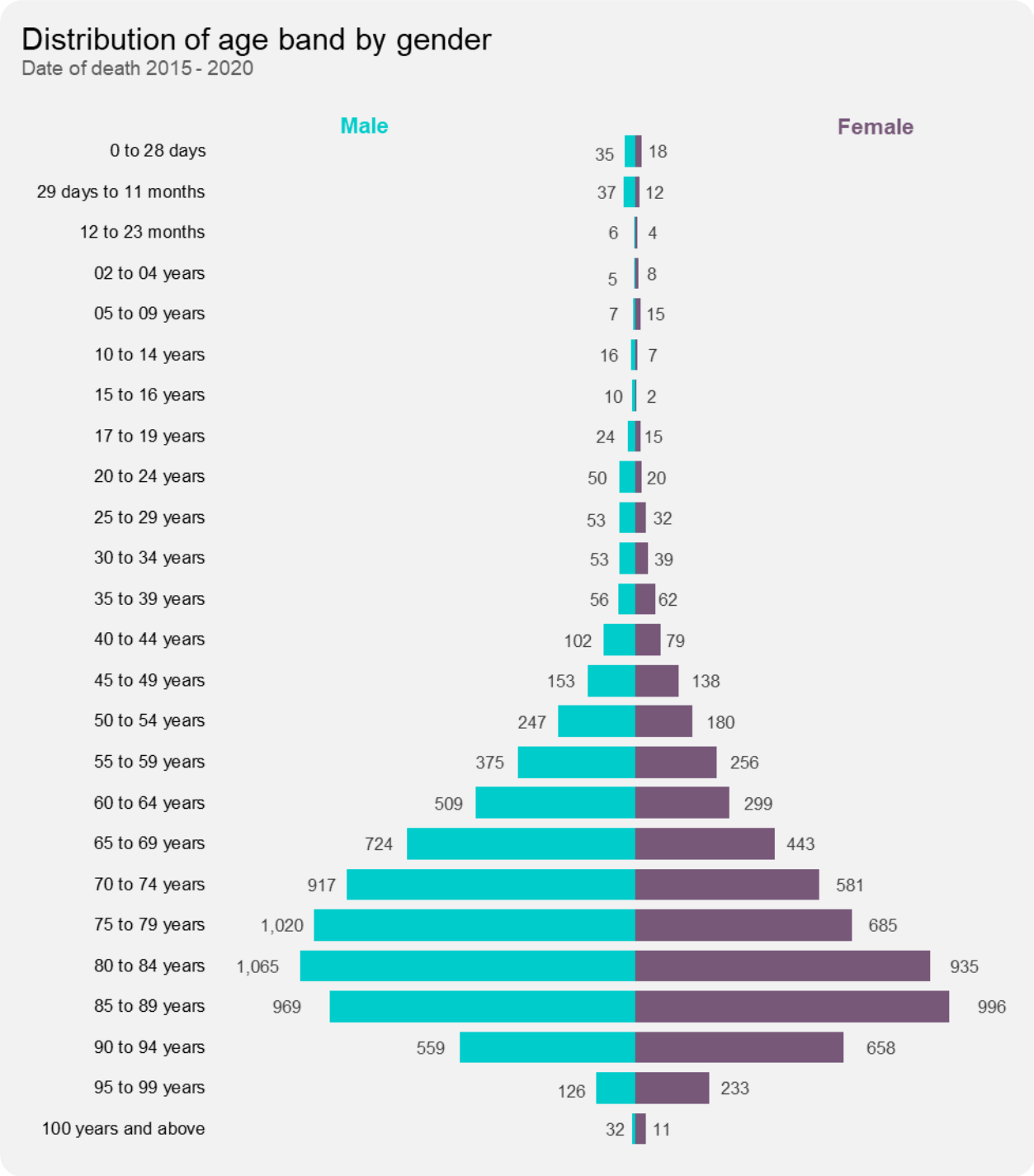


Figure 8: Deaths by age band and gender over the 6-year period (2015-2020).

Surgical Specialty Trend Data 2015-2020

Figure 9 shows the distribution of deaths for the admitting specialty. The top three specialities are General Surgery, Orthopaedics and Neurosurgery respectively within the 6-year reporting period.

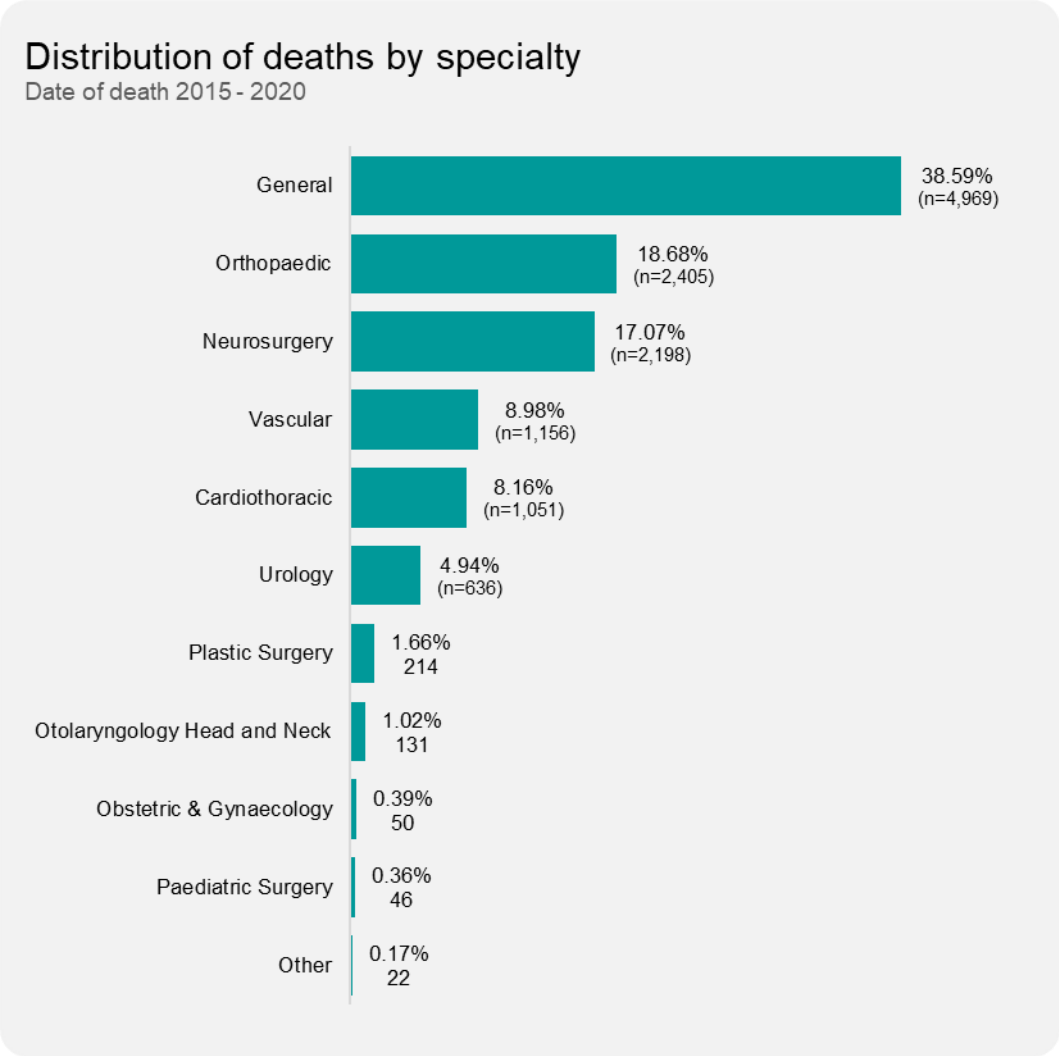
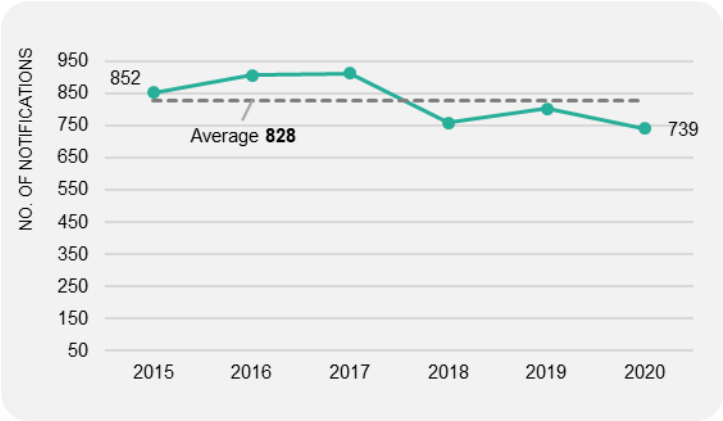


Figure 9: Distribution of deaths by specialty over the 6-year period (2015-2020).

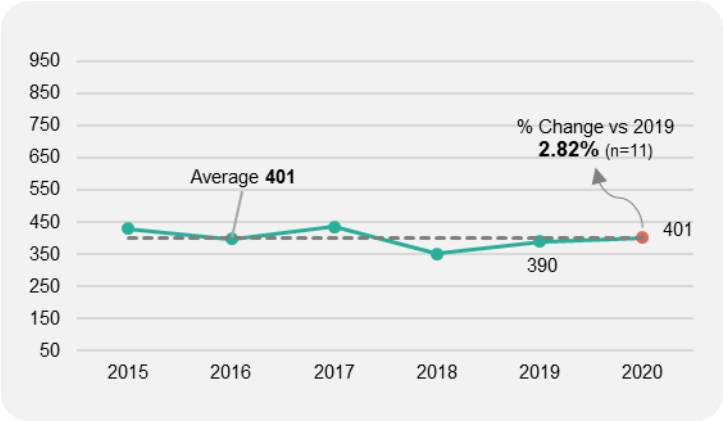
Note: Ophthalmology (n=12) and Oral/Maxillofacial (n=10) are added to the 'Other' category. Refer to Figure 14 for more details.

Figure 10 shows trended data for the 'Top 6' admitting specialties by year of death. A consistent rate of death across each calendar year is demonstrated for these surgical admissions.

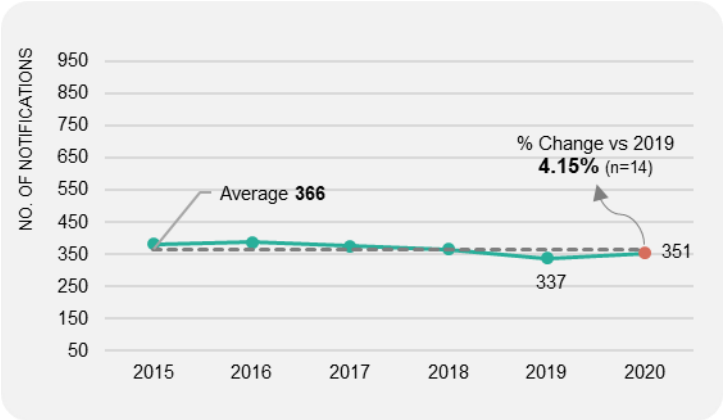
General Surgery
Total Notifications 4,969



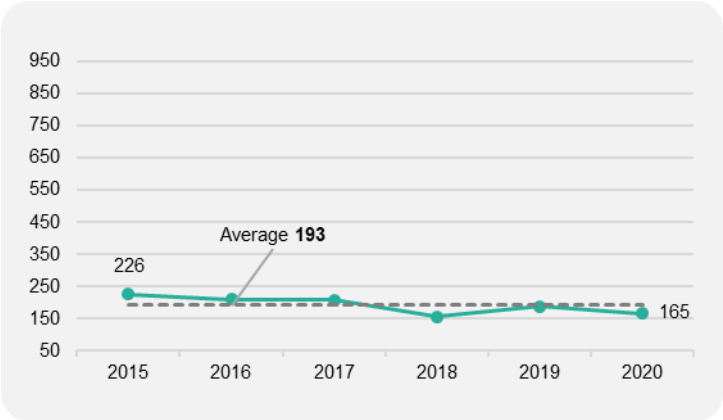
Orthopaedic Surgery
Total Notifications 2,405



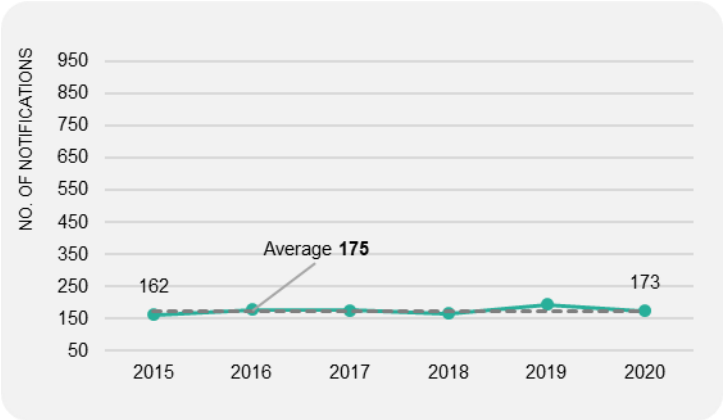
Neurosurgery
Total Notifications 2,198



Vascular Surgery
Total Notifications 1,156



Cardiothoracic Surgery
Total Notifications 1,051



Urological Surgery
Total Notifications 636

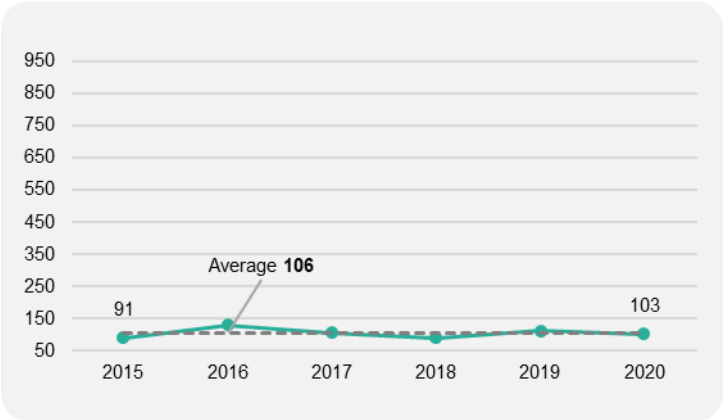


Figure 10: 'Top 6' admitting specialties by year (2015-2020).

Note: These specialties represent 96.4% (n=12,415) of all deaths notified to CHASM over the 6-year period.

The remaining 6 admitting specialties (Obstetrics & Gynaecology, Ophthalmology, Otolaryngology Head & Neck, Paediatric and Plastic) account for 3.6% (n=463) of deaths.

Figure 11 shows a slight decline in number for Otolaryngology Head & Neck since 2018, with deaths in 2019 and 2020 below the 6-year average (n=22).

Ophthalmology deaths occurring after 2017 were excluded from the audit as they did not meet criteria.

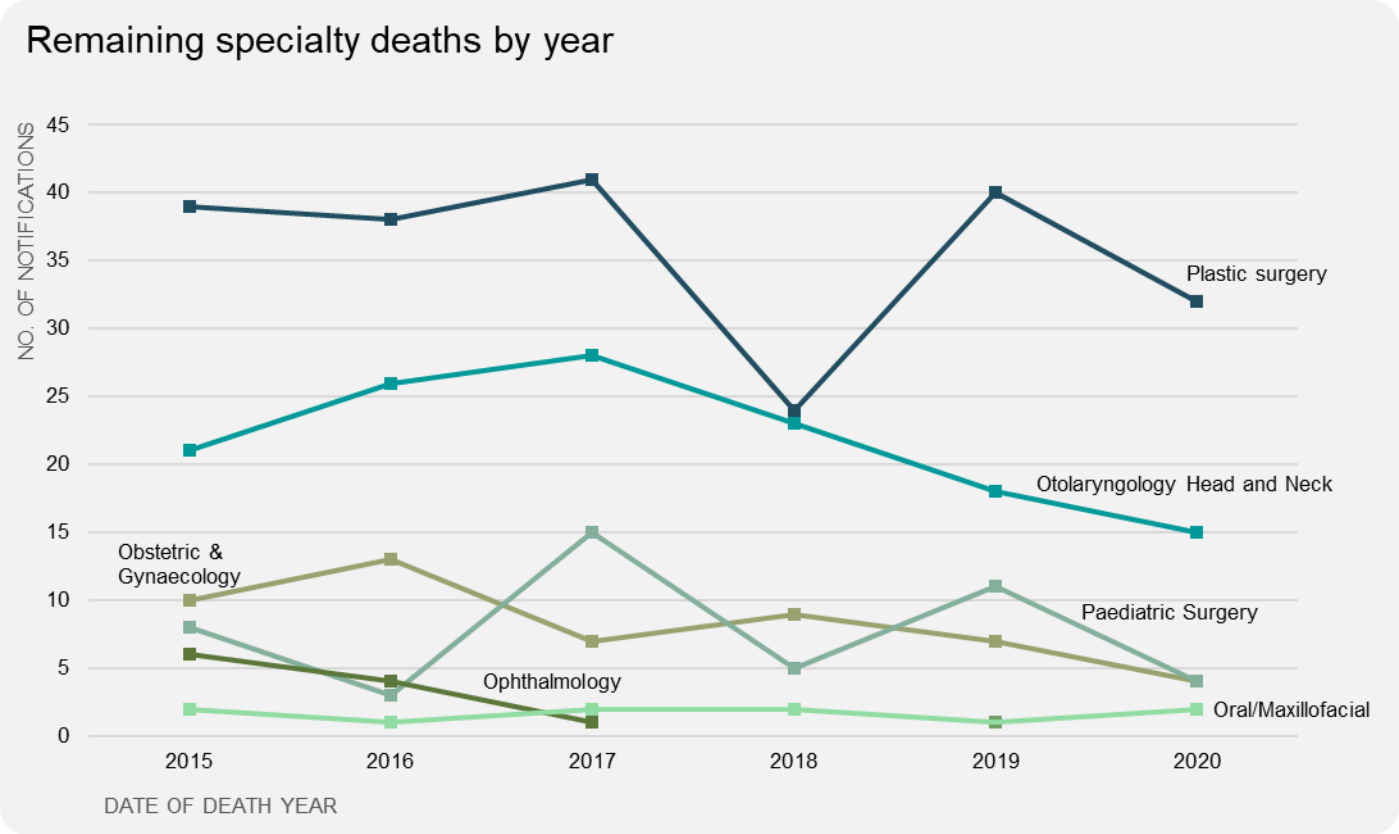


Figure 11: Remaining specialty deaths over a 6-year period (2015-2020).

Note: 'Other' in Figure 11 (n=22, 0.17%) is separated into Ophthalmology and Oral/Maxillofacial.

Days Variance for 2020

Data analysis was conducted on the number of days between the patient death and the time taken to notify CHASM. This is referred to as “days variance”. Analysis identified 33.59% (n=667) of notifications were received within 60 days of a patient death and 19.49% (n=387) notified between 61 to 90 days of death.

In 2020, there were 5 notifications received on the same day of the death occurring. This is the highest number of same day notifications of death over the 6-year period, as shown in Figure 12 below.

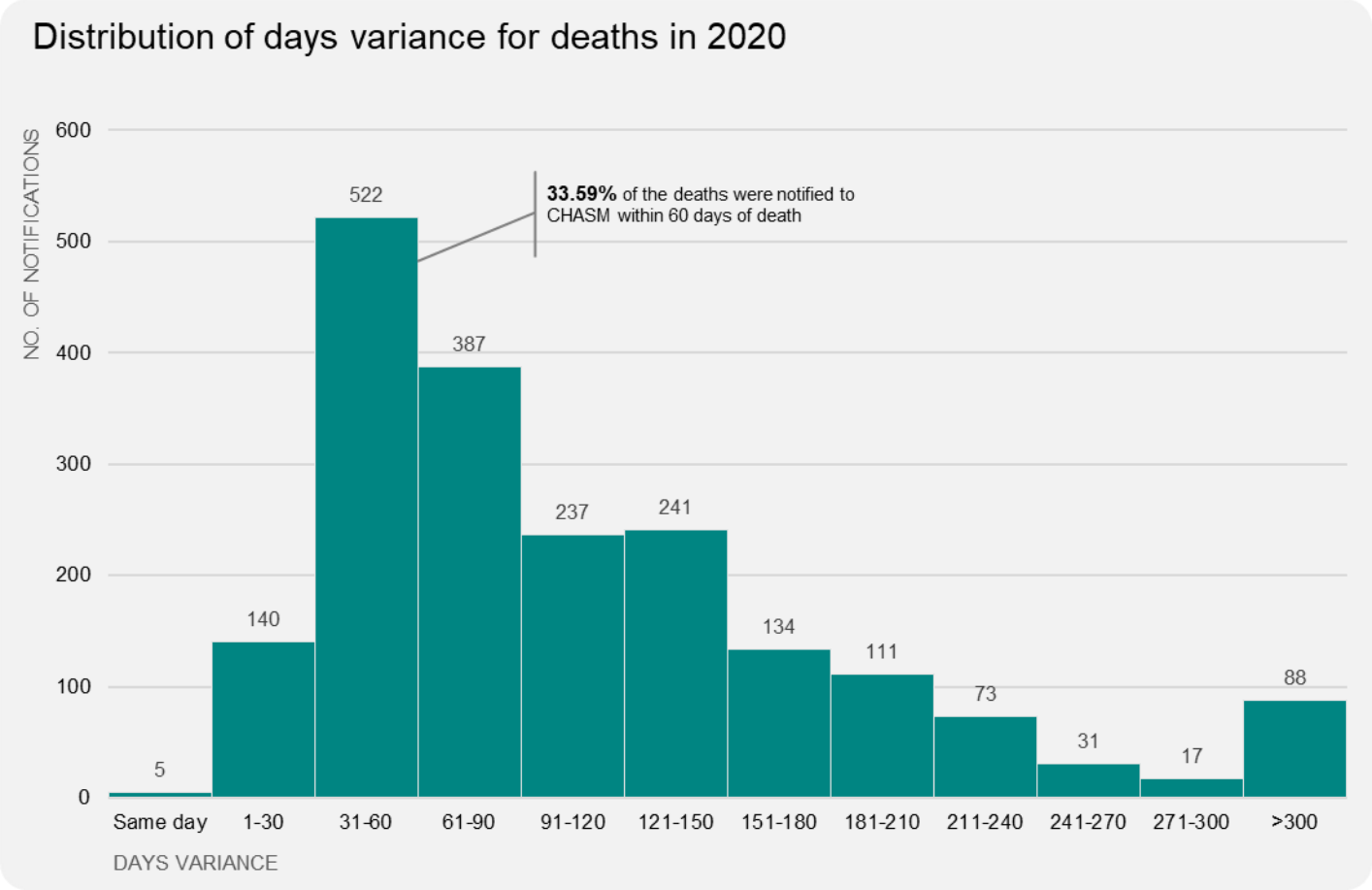


Figure 12: Distribution of days variance for notifications of death in 2020.

Note: The data extract includes all deaths occurring in 2020 and calculates the days variance for submissions by hospital group and from self-reporting surgeons up to and including 20 October 2022.

Further analysis shows the notifications received within 90 days of death, and outside 90 days of death, by Hospital Group. Over the 6-year reporting period on average 57.5% of notifications were received within 90 days. Figure 13 shows notifications received within and outside of 90 days of death by hospital group.

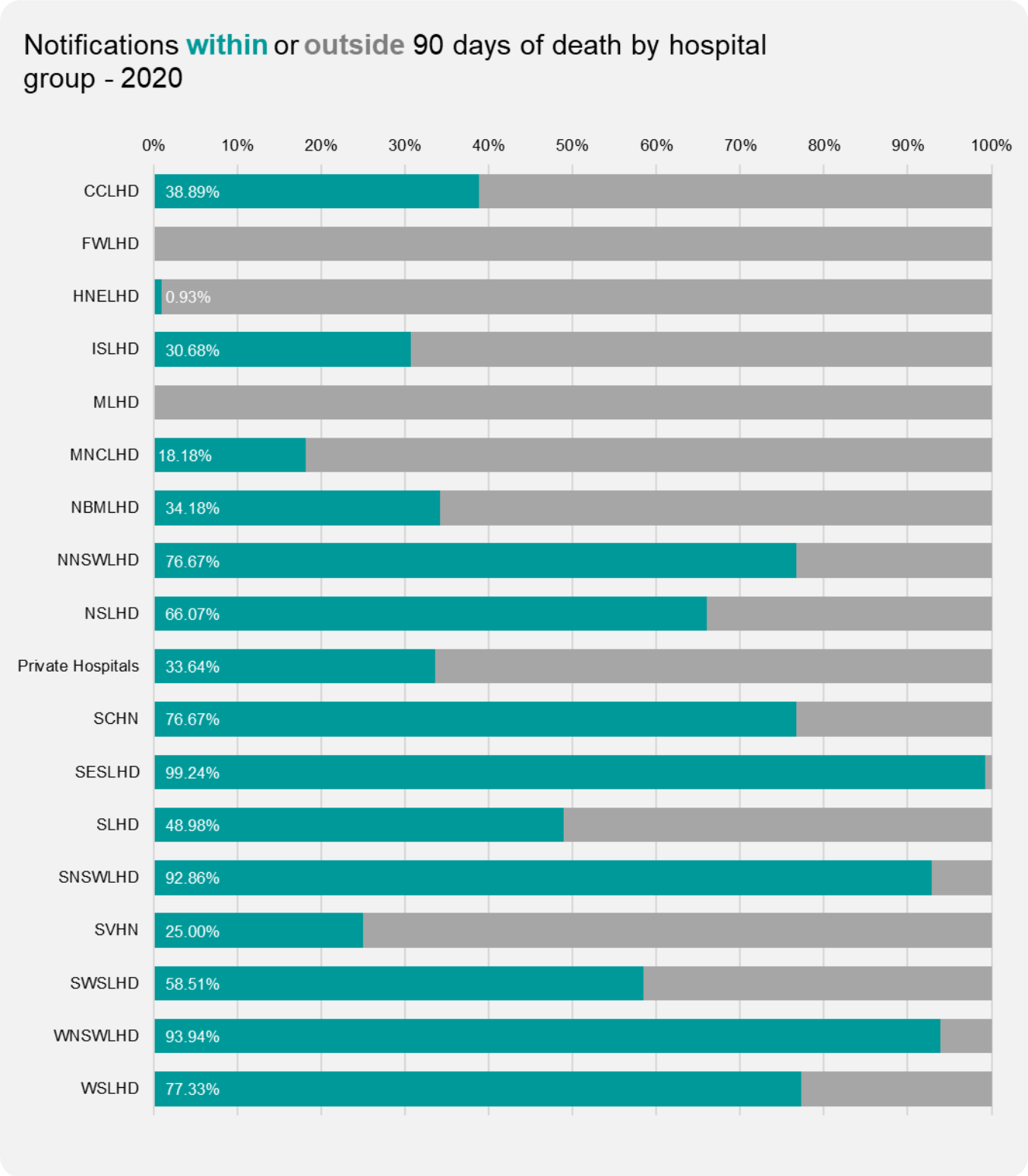


Figure 13: Notifications submitted ≤ 90 days and ≥ 90 days after a death in 2020.

Comparison of Days Variance 2019 and 2020

Of the 18 hospital groups, in 2020, 8 submitted more than 50% of their notifications within 90 days of the patient's death, while 12 out of the 18 hospital groups submitted more than 50% of their notifications within 90 days of the patient's death in 2019. Figure 14 below, compares the percentage of total notifications for 2019 and 2020 by hospital group which were submitted within 90 days of death.

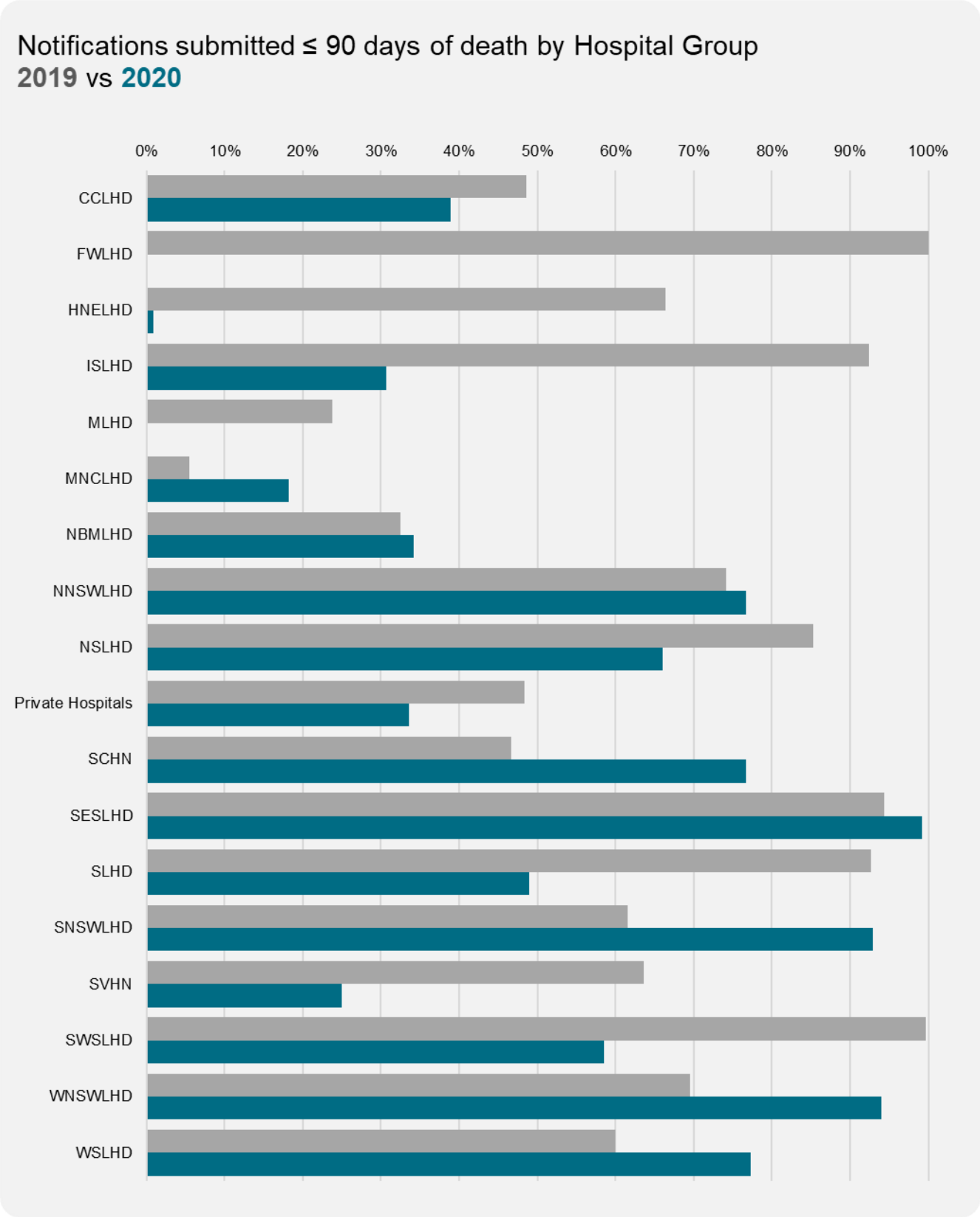


Figure 14: Comparison of notifications submitted within 90 days of death by Hospital Group (2019:2020).

Note: Due to changes in staffing levels and clinical demand in 2020, some hospitals experienced reporting delays in excess of 90 days, which appears as zero activity in this chart.

Days Variance Trend Data 2015-2020

Business changes implemented following the transition to the Bi-National Audit System in July 2018 and the alignment of the notification process with the NSW Health Death Review Database standards, to increase notification time from 30 days after death to 45 days, shows the expected increase in reporting for the 31-60 days for Hospital Groups in Figure 15 below.

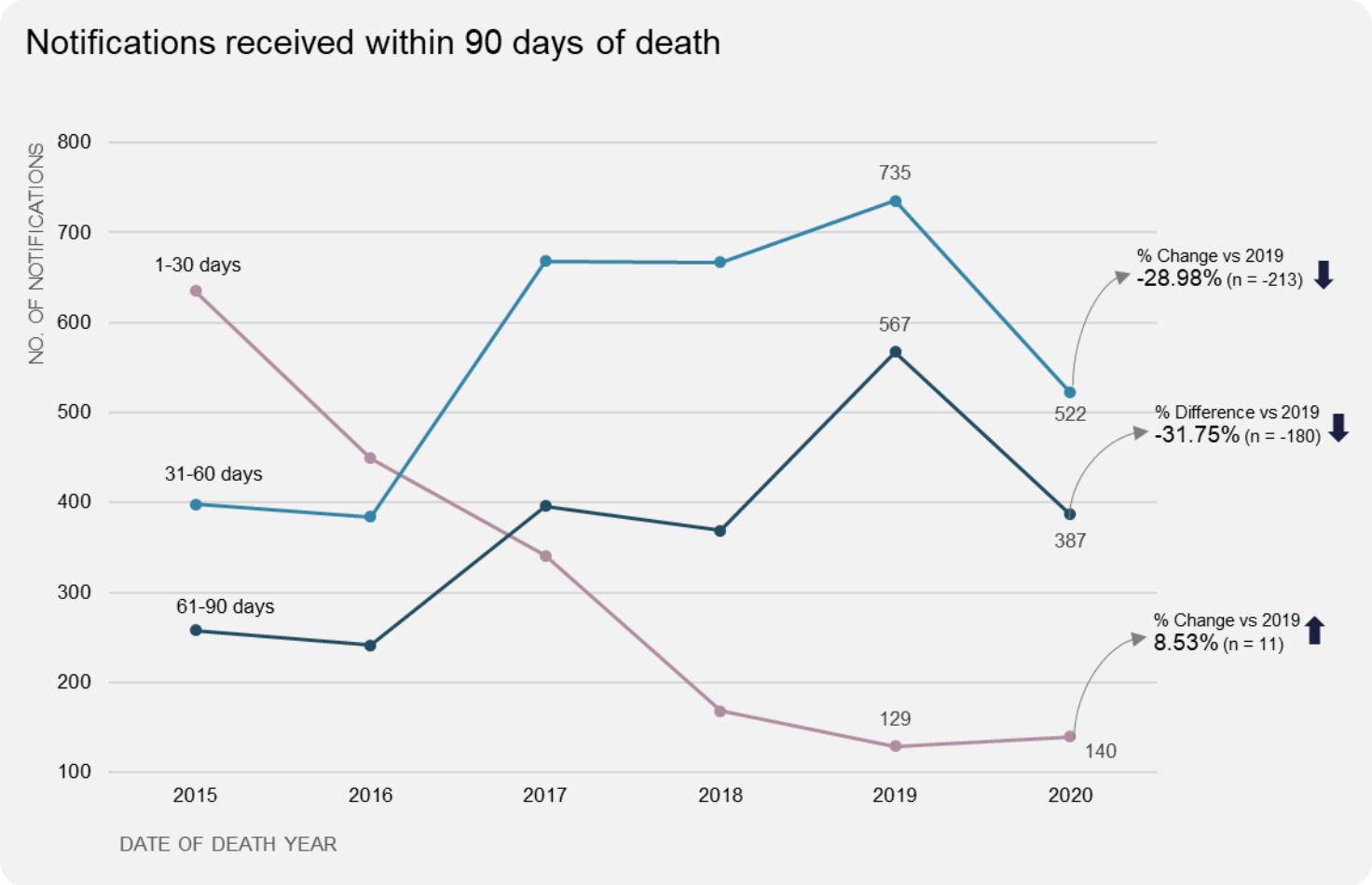


Figure 15: Notifications received from Hospital Groups within 90 days of death (2015-2020).

Response Rates - Hospital Groups 2020

There were 1,989 requests for information issued to surgeons for deaths occurring in 2020. In response, 1,645 surgical case forms (including 362 cases classified as Terminal Care) were submitted by surgeons, with 1,260 cases completing the audit process. A total of 1,710 cases were created, including 53 multi-surgeon cases with 113 surgical case forms submitted.

Surgeons' response rates by Hospital Group are shown in Figure 16, below. The average response rate was 82.66%, with surgeons from 6 entities achieving a rate of over 90%.

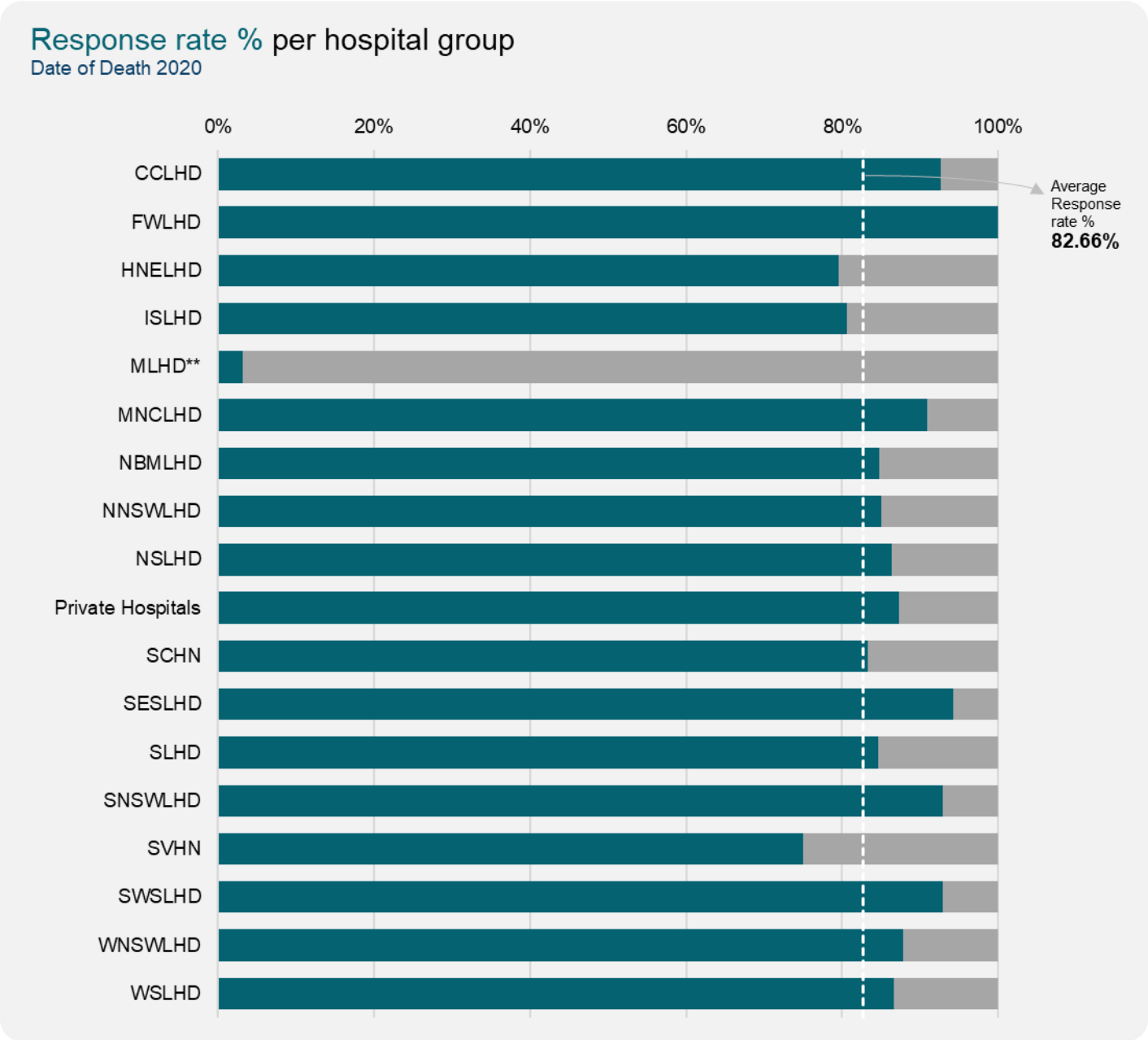


Figure 16: Surgeon response rates for 2020 deaths by Hospital Group (data extracted on 21/10/2022).

***The low response rate for MLHD is due to resourcing issues which caused a delay in notification of deaths.*

Note: Notifications of death identified as Excluded – Error, Lost to follow up, and Closed – Non Participant are not included in the 2020 response rates.

Response Rates – Days Variance 2019-2020

A comparison of surgeon response rates was conducted between 2019 and 2020 deaths, as shown in Figures 17 and 18. A slight increase (n=13) in rapid response / same day submissions for 2020 is seen, which includes surgeons self-reporting deaths to CHASM using fellows interface.

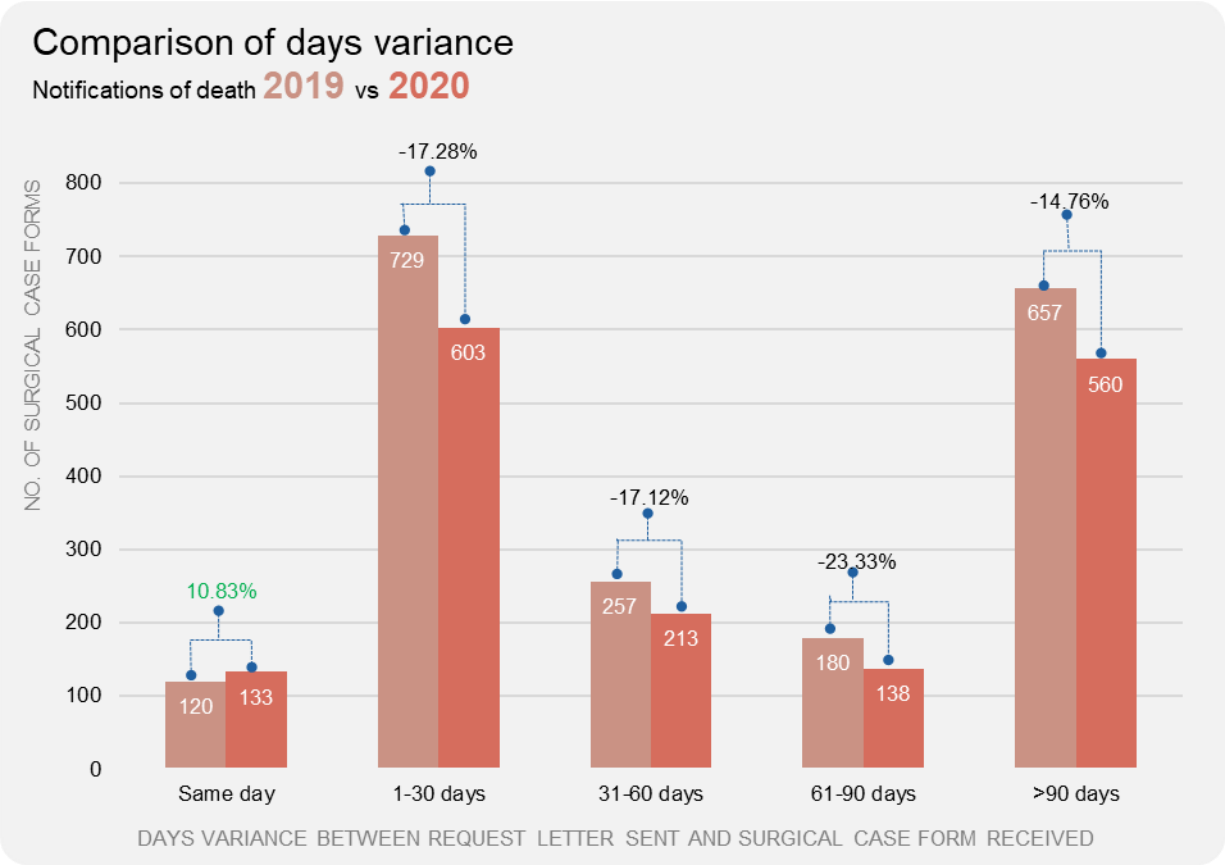


Figure 17: Comparison of days variance for SCFs submitted – 2019 vs 2020.

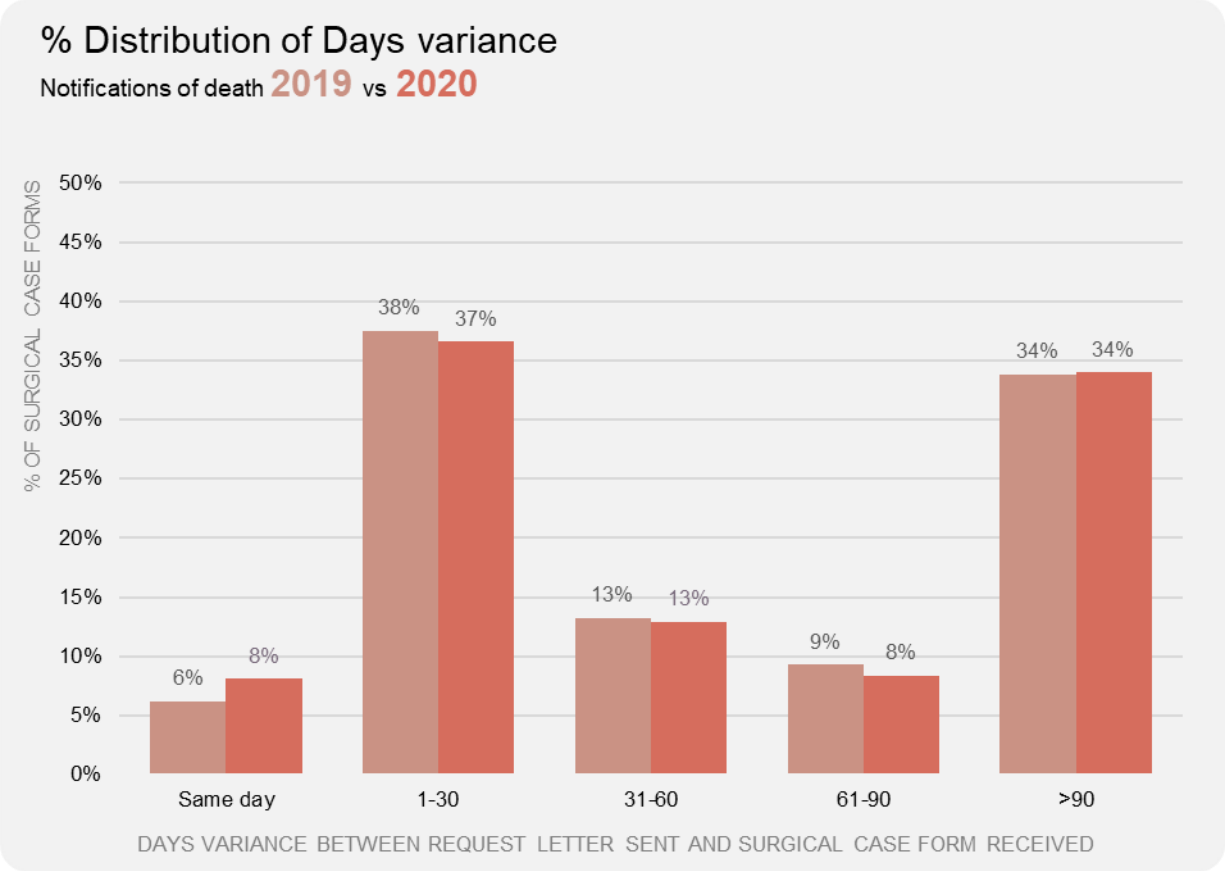


Figure 18: Percentage comparison of days variance for SCFs submitted – 2019 vs 2020.

First Line Assessments – Activity in 2020

First Line Assessments are conducted by an independent peer of the same specialty as the operating surgeon. The surgical case form is read and the assessor answers 12 questions, including whether the case should progress for Second Line Assessment (Case Note Review). From the information provided in the Surgical Case Form, the assessor determines whether there were any Areas for Consideration, Concern or Adverse Events (ACONs) in the management of the patient and provides comments for feedback to the operating surgeon.

In 2020, there were 1,406 First Line Assessments completed by surgeons participating as first line assessors. From these, 15.72% (n=221) of cases were identified as having an ACON / Clinical Management Issue (CMI).

Second Line Assessments – Activity Trend Data 2015-2020

Second Line Assessment is a review by an independent peer of the same specialty. This is based on the details provided by the operating surgeon in their Surgical Case Form and the patient's medical records. The Second Line Assessor addresses any issues identified by the First Line Assessor to clarify if there were any areas of care that required further consideration.

Over the 6-year reporting period, there were 887 cases that had proceeded to a Second Line Assessment (case note review) by a peer consultant surgeon. Second Line Assessors identified an Area of Consideration, Concern, or Adverse Event (ACON) in 71.25% (n=632) of cases reviewed. The remaining 255 cases had no clinical management issues identified, which is shown in Figure 19.

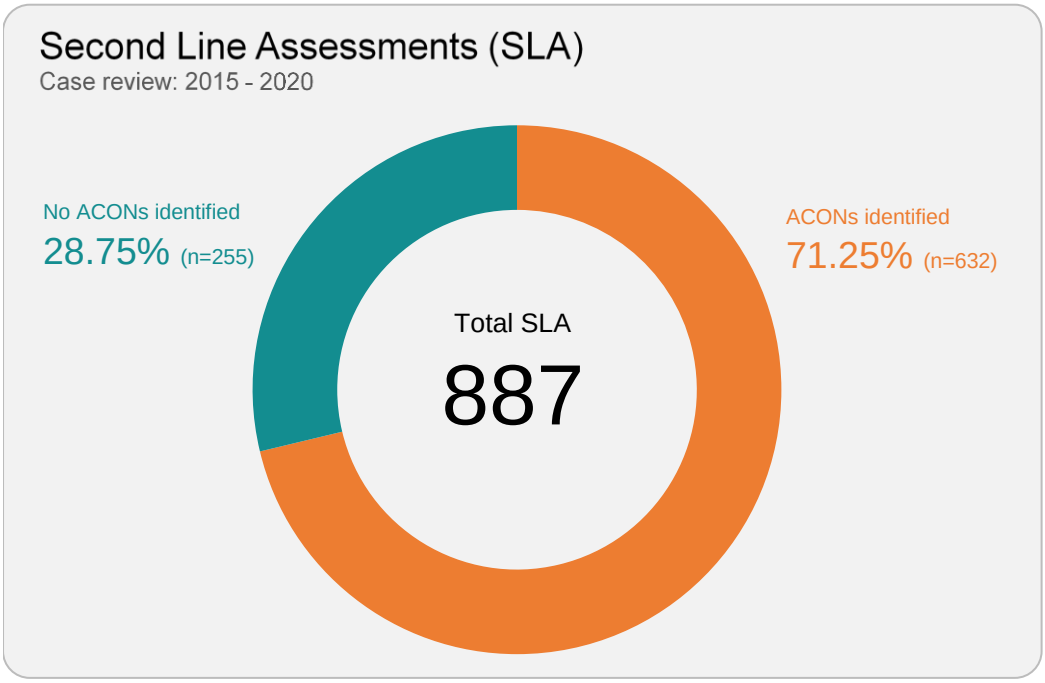


Figure 19: Identified ACONs for Second Line Assessments conducted in 2015-2020.

Note: Data extraction occurred on 20/11/2022.

Further review of the data by case assessment year shows the highest activity for Second Line Assessments (SLAs) occurred in 2017 (n=205), with 77.07% of cases having an area of consideration, concern, or adverse event. Compared to 2019, there was a slight increase in ACONs with 62.4% (n=78) identified, as shown in Figure 20, below.

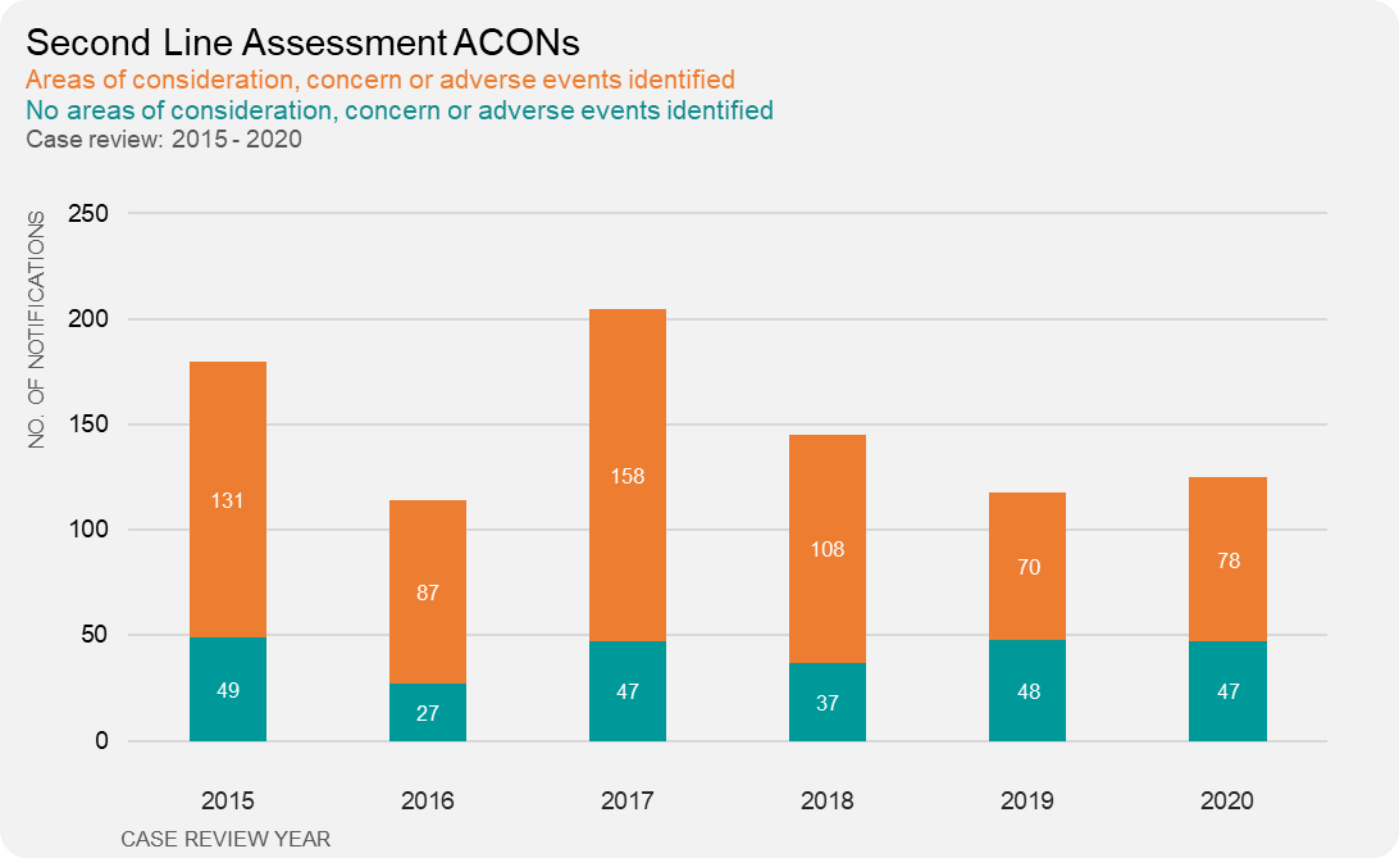


Figure 20: Outcomes for Second Line Assessments by assessment year 2015-2020.

The ability to undertake peer review electronically has allowed First, and Second, Line Assessors to complete their submissions in as little as 24-48 hours, depending on the complexity of the case. CHASM is grateful for the commitment of its surgeons and assessors, and their input to this valuable program.

Areas of Considerations – Themes for 2020 deaths

At the time of the data extraction, 43* deaths from 2020 underwent Second Line Assessment, with 50 ACONs identified in 58.14% (n=25) of cases. The parent group 'Delays' was identified as the most frequent ACON selected (n=15), followed by 'Incorrect/Inappropriate therapy' (n=13), as shown in Figure 21.

Delays includes such events as: Delay to surgery - earlier operation desirable; Delay in diagnosis; Delay in starting medical treatment; and Delay in recognising complications.

Incorrect/Inappropriate therapy includes such events as: Better to have done different operation or procedure; Decision to operate; Unsatisfactory medical management; and wrong surgical approach.

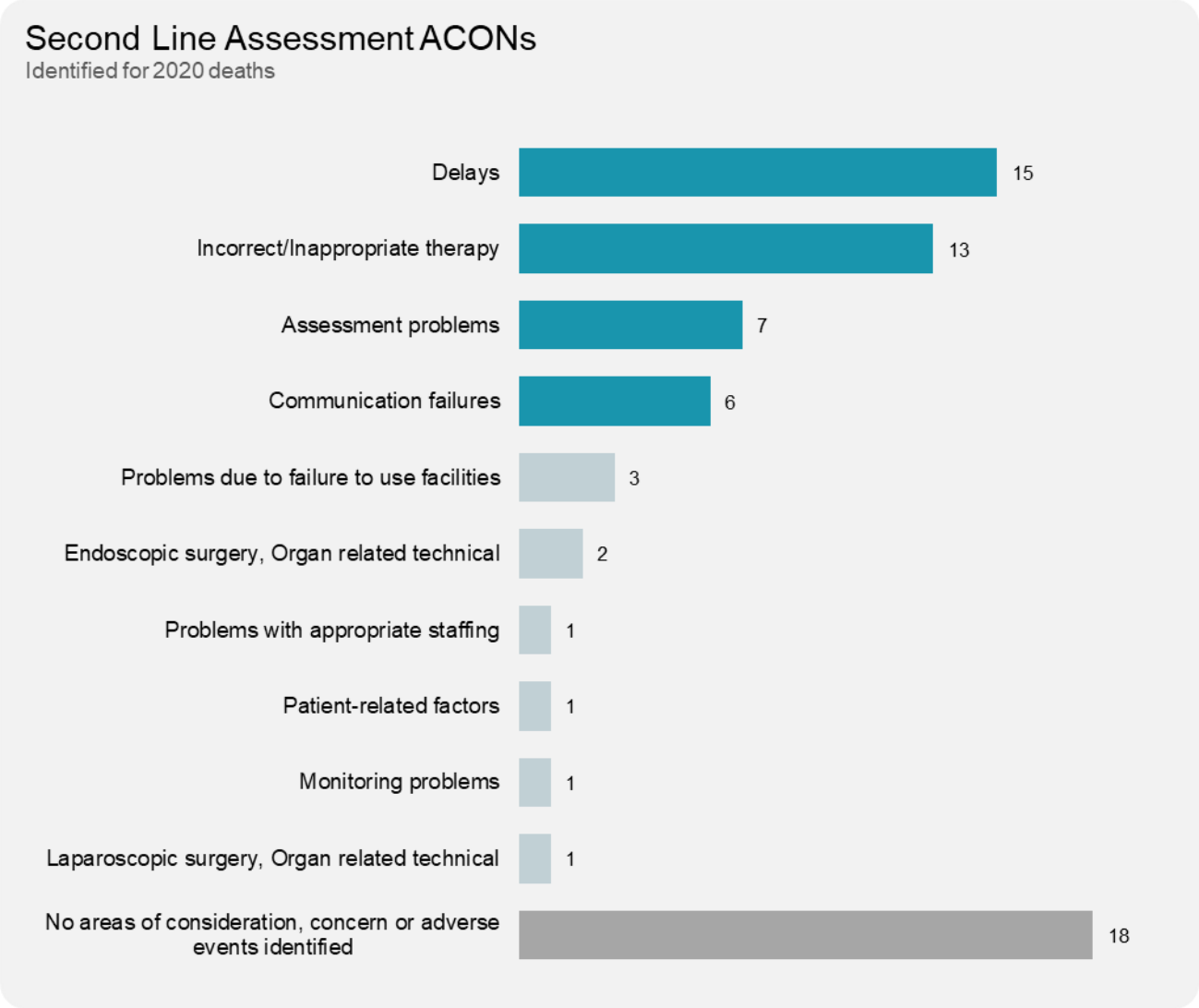


Figure 21: Areas of consideration identified in SLAs for deaths in 2020.

Note: This is a frequency count (n=68) as a case may have multiple ACONs identified.

** Due to the duration of the peer review process and time taken to review and assess a case, the number of 2020 deaths reviewed at Second Line Assessment is not final.*

Table 1 spans pages 72 and 73 and shows a breakdown of the 'Top 4' ACON groups identified in 2020. Each group contains a description of the ACON applied to the issue identified by the Second Line Assessor.

Delays

ACON Description	Frequency count
Delay to surgery (i.e., earlier operation desirable)	3
Delay in diagnosis	3
Delay in investigating the patient	2
Delay in recognising anastomotic leak	2
Operation would have been better deferred or delayed	1
Delay to re-operation	1
Delay in recognising a bleeding complication	1
Delay starting medical treatment	1
Delay in recognising complications	1
Total	**15**

Incorrect/Inappropriate therapy

ACON Description	Frequency count
Decision to operate	5
Unsatisfactory medical management	2
Pre-operative fluid overload	1
Operation should have been done	1
Re-operation should have been done	1
Better to have performed more limited surgery	1
Better to have done different operation or procedure	1
Operating following recent cessation of anticoagulant drug	1
Total	**13**

Assessment problems

ACON Description	Frequency count
Failure to recognise severity of illness	3
Pre-optimisation should have been used	1
Inadequate respiratory assessment - no operation performed	1
Failure to investigate or assess patient fully	1
Inadequate post-operative laboratory assessment	1
Total	**7**

Communication failures

ACON Description	Frequency count
Failure to communicate with senior staff	2
Poor documentation	1
Poor communication between physician and surgeon	1
Failure in communication between x-ray department and clinicians	1
Failed surgical communication through rotation of staff	1
Total	**6**

Table 1: Breakdown of the 'Top 4' ACON groups identified in 2020.

Areas of Consideration – Trend Data 2015-2020

Figure 22 shows the Top 5 ACONs identified for the 6-year period 2015-2020 for second line assessments and their rankings over time.

The ACON group positioned first in 2019, *Incorrect/Inappropriate therapy*, dropped to second position in 2020. While *Delays,* which has been consistently placed second position since 2015, ranked at first in 2020.

The ranking of *Assessment problems* and *Communication failures* were consistent across the 6-year reporting period. The most significant change was for *Problems due to failure to use facilities*, which ranked fifth in 2020, sixth in 2019, then dropped to ninth in 2018, eighth in 2017, and returning to sixth in 2016-2015.

Figure 22: Ranking trend by year for the 2020 Top 5 ACONs in the 6-year reporting period 2015-2020.

Pre-operative Delays to Main Surgical Diagnosis – Trend Data 2015-2020

Figure 23 depicts delays in confirmation of a pre-operative main surgical diagnosis, as indicated on surgical case forms for 2015 – 2020 deaths. Delays may be associated with factors outside the control of the surgeon and could include diagnostic, resource, staffing or equipment challenges.

Of the overall responses received from surgeons (n=9,889), 5.64% (n=558) patients experienced a delay in confirmation. 92.97% (n=9,194) of responses indicated no pre-operative delay in confirmation of main surgical diagnosis.

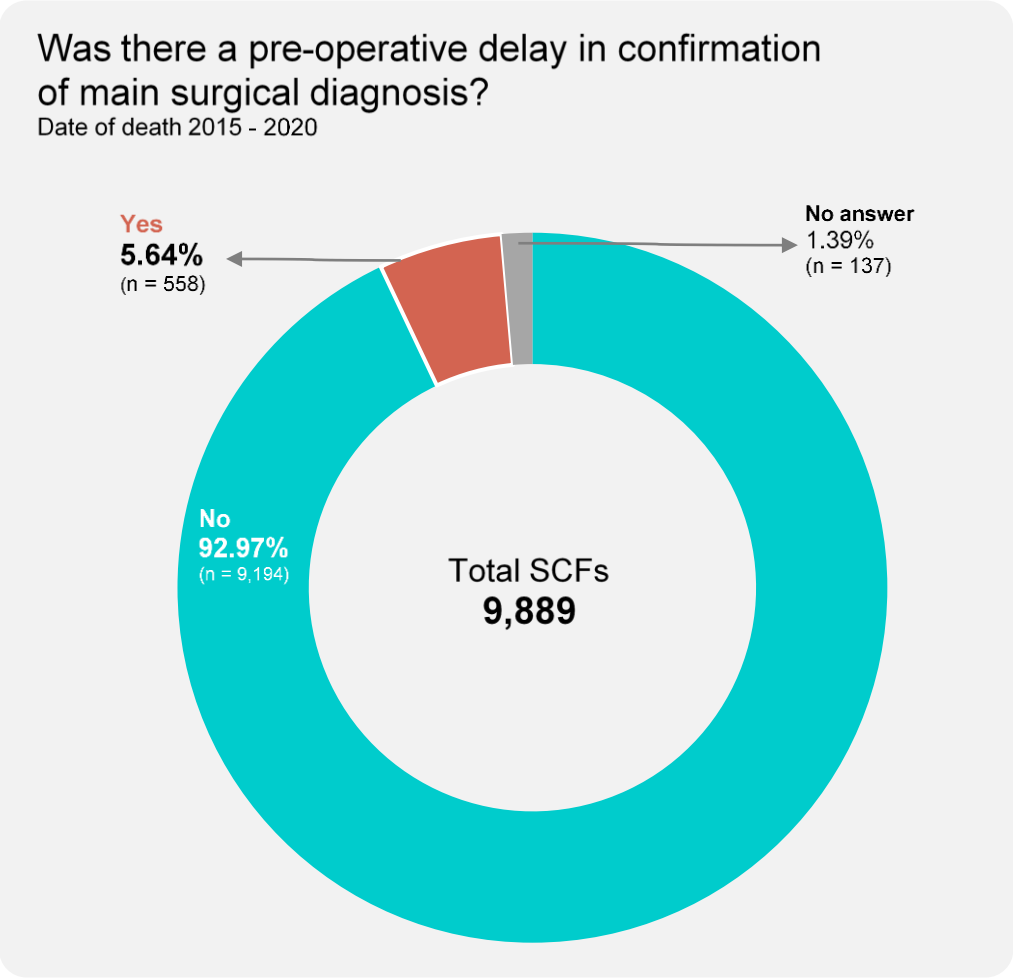


Figure 23: Delay in diagnosis responses for deaths in 2015-2020.

Figure 24 shows the breakdown of responses for delays in confirming main surgical diagnosis by year, which indicates a consistent downward trend in delays since 2017.

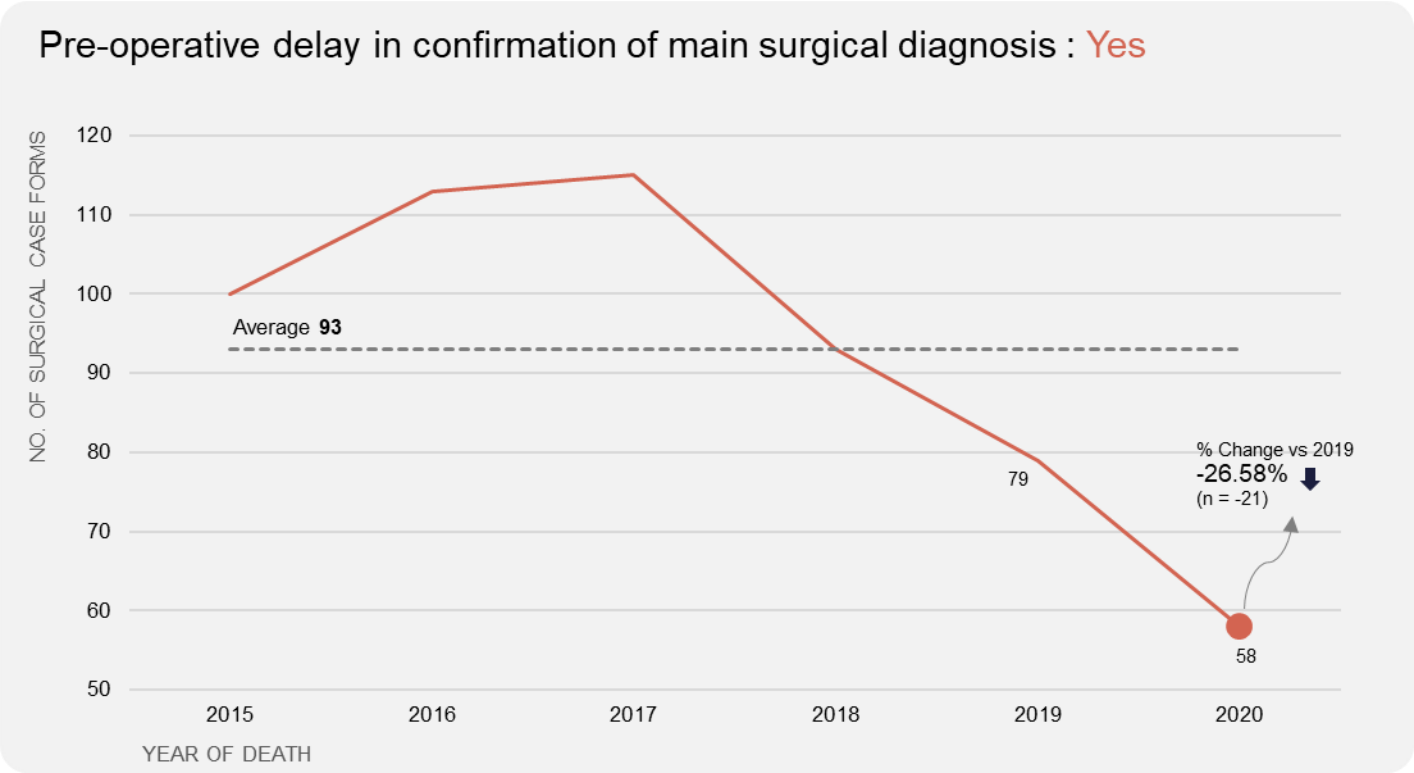


Figure 24: Delay to diagnosis responses (n=558) by year 2015-2020.

Responses where a delay was not experienced identified 2017 as the highest response (1,733) to this question, with a 6-year average of 1,532, as shown in Figure 25.

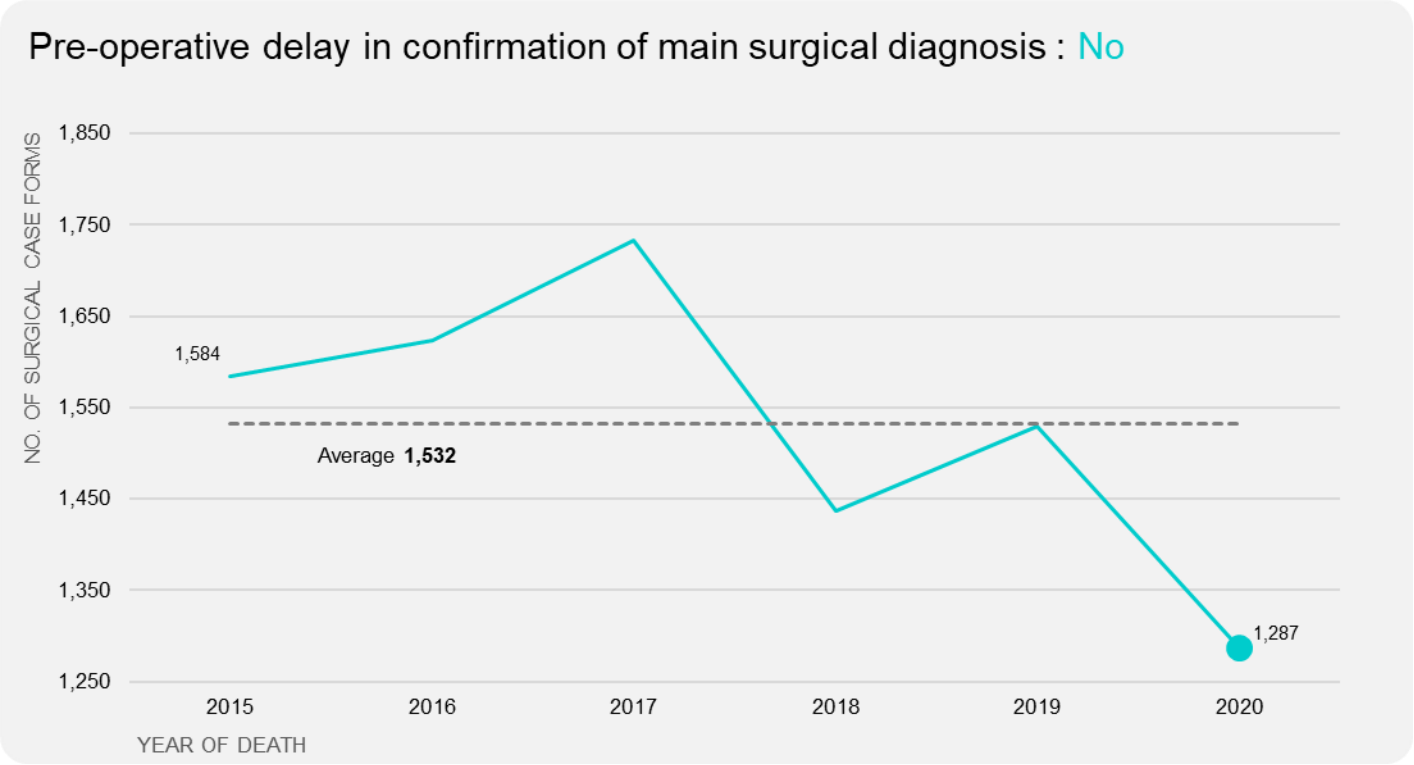


Figure 25: No delay to diagnosis responses (n=9,194) by year 2015-2020.

Main Surgical Diagnosis – Top 20 Categories 2020

Surgical case forms submitted for 2020 deaths, showed a main diagnosis was provided in 99.70% instances (n=1,341). Analysis on cases where no main diagnosis was established, identified patients experienced a rapid decline or death.

Figure 26 shows the 'Top 20' responses for deaths occurring in 2020. The highest response was for parent group *Fracture of Neck of Femur* (n=169) followed by *Internal obstruction without mention of hernia* (n=93).

Of note, the "other" category (n=67) has two diagnoses which could be included in the 'Top 20' as separate categories due to the high number of responses, they are: *Trauma* (n=18) and *Ruptured intracranial aneurysms(s)* (n=18).

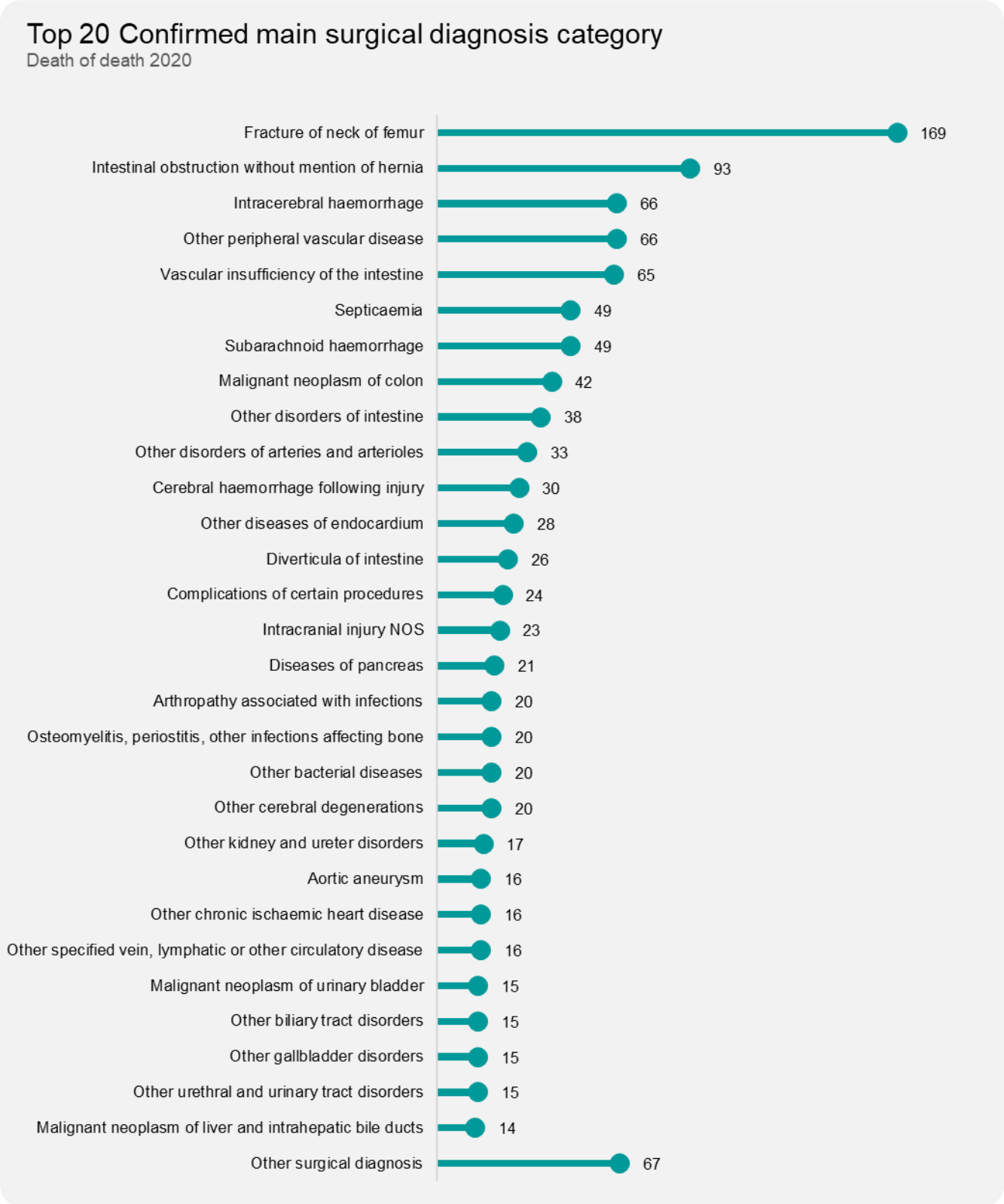


Figure 26: Top 20 Main Surgical Diagnosis based on frequency count for deaths in 2020.

The tables below display the breakdown of the 'Top 5' Main Surgical Diagnosis parent groups and expands the 'Other Surgical Diagnosis' category to show the sub-categories selected. Table 2 shows the sub-categories within the *fracture neck of femur* parent group. Tables 3 to 9 show the remaining parent groups.

Fracture of neck of femur

Surgical diagnosis	Frequency count
Fracture of neck of femur	98
Closed fracture proximal femur, subcapital, Garden grade unspecified	30
Closed fracture of femur, intertrochanteric	28
Closed fracture of proximal femur, pertrochanteric	4
Closed fracture proximal femur, subtrochanteric	3
Closed fracture proximal femur, intertrochanteric, two parts	1
Subtrochanteric fracture	1
Pertrochanteric fracture	1
Closed fracture proximal femur, intracapsular section, unspecified	1
Closed fracture of unspecified proximal femur	1
Closed fracture proximal femur, basicervical	1
Total	**169**

Table 2: Sub-category breakdown for 'Fracture of neck of femur' for deaths in 2020.

Intestinal obstruction without mention of hernia

Surgical diagnosis	Frequency count
Other intestinal obstruction	30
Intestinal obstruction	27
Intestinal adhesions with obstruction	11
Volvulus of the sigmoid colon	8
Pseudo-obstruction	6
Ileus, unspecified	4
Acute intestinal obstruction	2
Volvulus	2
Volvulus of the ileocaecum	1
Volvulus of the small bowel	1
Stenosis of intestine	1
Total	**93**

Table 3: Sub-category breakdown for 'Intestinal obstruction without mention of hernia' for deaths in 2020.

Intracerebral haemorrhage

Surgical diagnosis	Frequency count
Intracerebral haemorrhage	33
Intracerebral haemorrhage, intraventricular	21
Cerebellar haemorrhage	6
Pontine haemorrhage	4
Basal nucleus haemorrhage	2
Total	**66**

Table 4: Sub-category breakdown for 'Intracerebral haemorrhage' for deaths in 2020.

Other peripheral vascular disease

Surgical diagnosis	Frequency count
Other peripheral vascular disease	61
Peripheral vascular disease	3
Gangrene of hand	1
Peripheral gangrene	1
Total	**66**

Table 5: Sub-category breakdown for 'Other peripheral vascular disease' for deaths in 2020.

Vascular insufficiency of the intestine

Surgical diagnosis	Frequency count
Vascular insufficiency of the intestine	61
Chronic ischaemic colitis	1
Thrombus of the superior mesenteric veins	1
Mesenteric thrombus	1
Thrombus of the superior mesenteric artery	1
Total	**65**

Table 6: Sub-category breakdown for 'Vascular insufficiency of the intestine' for deaths in 2020.

Septicaemia

Surgical diagnosis	Frequency count
Septicaemia	42
Septicaemia due to Staphylococcus aureus	3
Staphylococcal septicaemia	2
Other specified septicaemias	1
Gram negative septicaemia	1
Total	**49**

Table 7: Sub-category breakdown for 'Septicaemia' for deaths in 2020.

Subarachnoid haemorrhage

Surgical diagnosis	Frequency count
Subarachnoid haemorrhage	33
Subarachnoid haemorrhage from anterior communicating artery	6
Subarachnoid haemorrhage from middle cerebral artery	3
Subarachnoid haemorrhage from posterior communicating artery	3
Subarachnoid haemorrhage from vertebral artery	3
Subarachnoid haemorrhage from basilar artery	1
Total	**49**

Table 8: Sub-category breakdown for 'Subarachnoid haemorrhage' for deaths in 2020.

Other surgical diagnosis

Surgical diagnosis	Frequency count
Trauma	18
Ruptured intracranial aneurysm(s)	18
Fracture of prosthetic joint component	10
Severe head injury	6
Raised ICP, other	5
Ventricular septal rupture	2
Haemorrhagic shock	1
Wound infection/sinus	1
Craniotomy for chronic subdural haematoma	1
Triple vessel disease	1
Chronic subdural	1
Blocked CSF shunt	1
Arterio-venous fistula	1
Reduced conscious level - other	1
Total	**67**

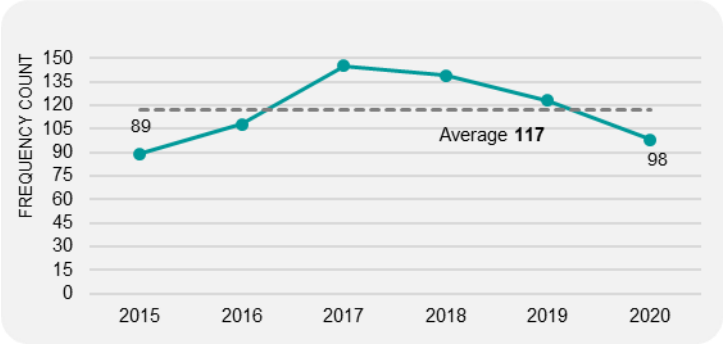
Table 9: Sub-category breakdown for ‘Other surgical diagnosis’ for deaths in 2020.

Main Surgical Diagnosis – Trend Data 2015-2020

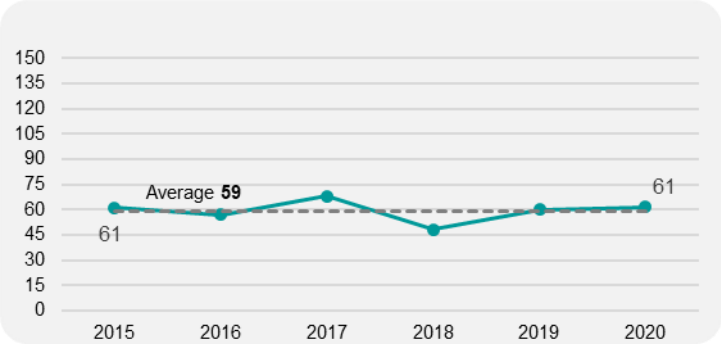
Figure 27 shows the distribution of 'Top 5' main surgical diagnosis by sub-category for deaths 2015 - 2020.

The highest frequency count (n=128) was for parent group *Fracture of neck of femur,* which had two sub-category variations represented in the 'Top 5' diagnosis, as did *Intracerebral haemorrhage.*

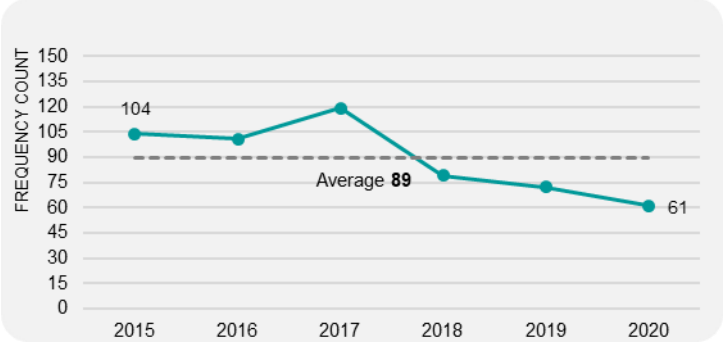
Fracture of neck of femur
Parent group: Fracture of neck of femur



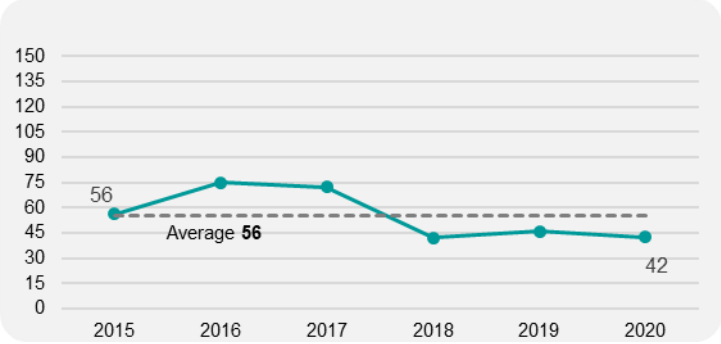
Other peripheral vascular disease
Parent group: Other peripheral vascular disease



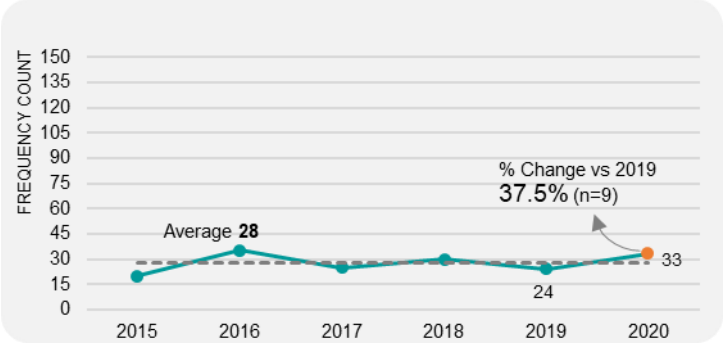
Vascular insufficiency of the intestine
Parent group: Vascular insufficiency of the intestine



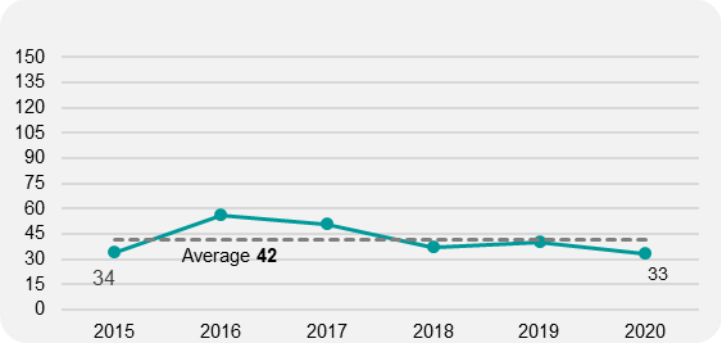
Septicaemia
Parent group: Septicaemia



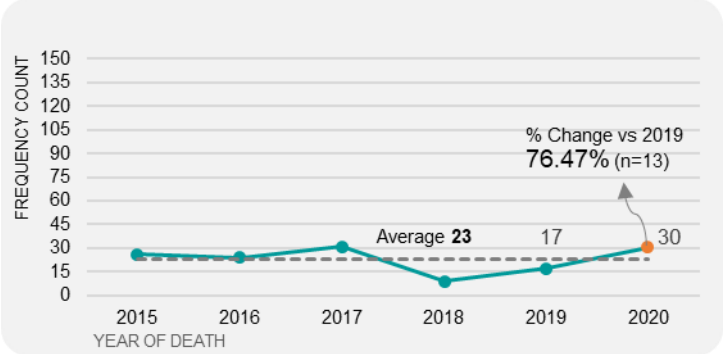
Intracerebral haemorrhage
Parent group: Intracerebral haemorrhage



Subarachnoid haemorrhage
Parent group: Intracerebral haemorrhage



Closed fracture proximal femur, subcapital, Garden grade unspecified
Parent group: Fracture of neck of femur



Other intestinal obstruction
Parent group: Intestinal obstruction without mention of hernia

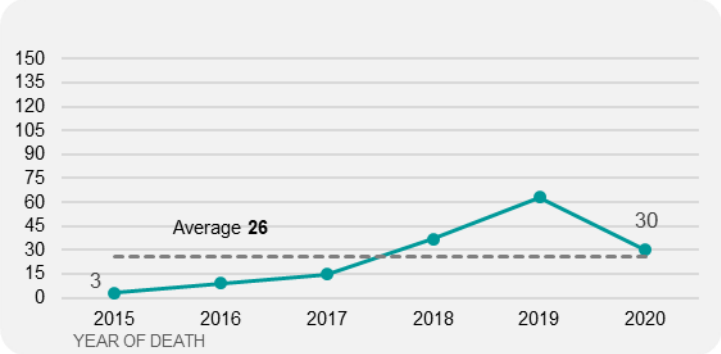


Figure 27: Distribution by year for Top 5 Main Surgical Diagnosis for deaths in 2015-2020.

Operational Procedures – Activity in 2020

Figure 28 shows the 'Top 15' most frequent operations undertaken for patient deaths in 2020. Neurosurgery had the highest frequency count (n=97) with *Burrhole operations for ventricular external drainage*.

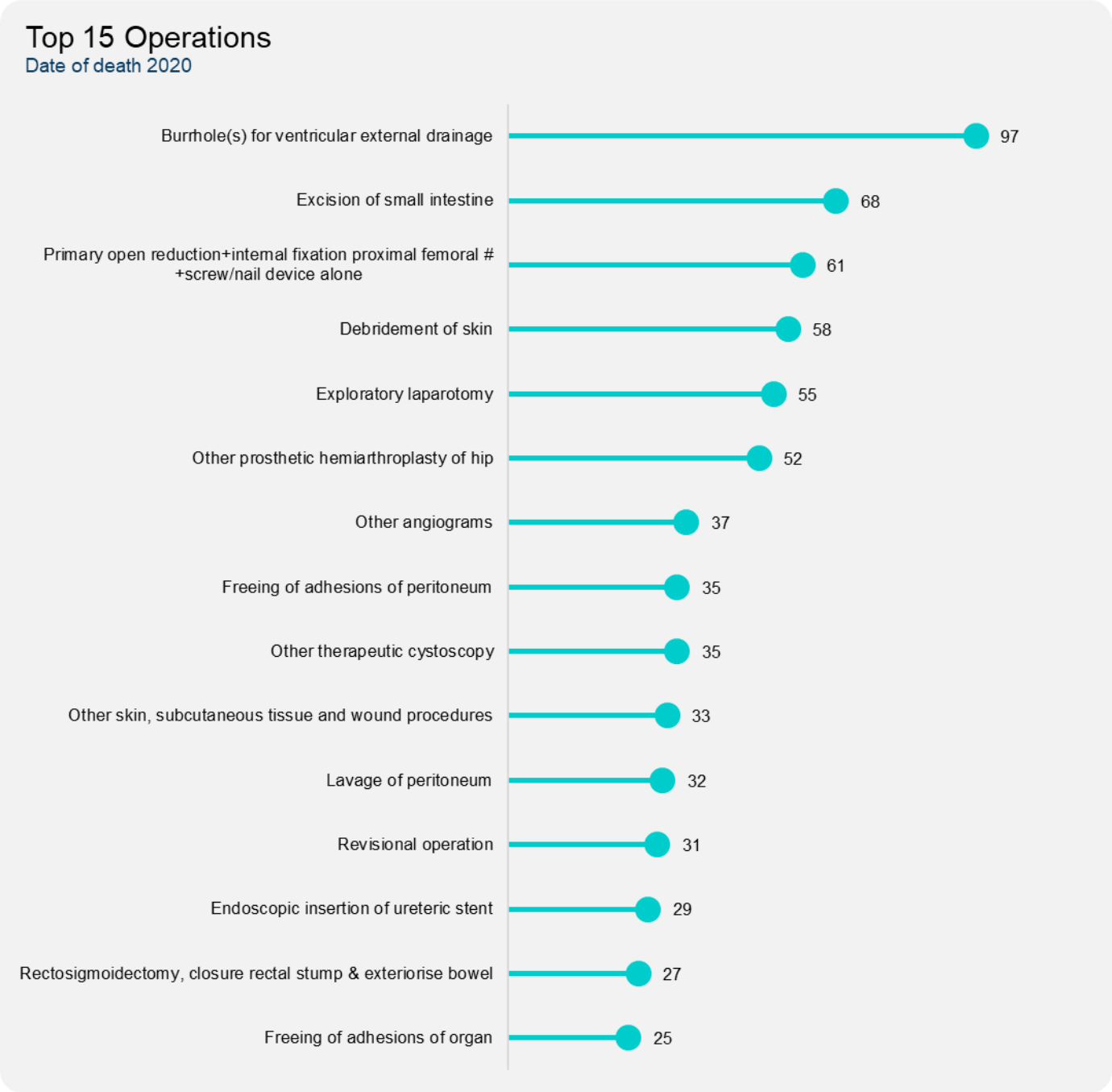


Figure 28: Top 15 operations reported for deaths in 2020 (Frequency count = 675).

Note: This is a multi-selection field resulting in a frequency count, as patients may have more than one operation performed during their admission. The category Other wound dressing had a high count (n=81) but is not included in the 'Top 15" list as it is not considered an operation. This classification is generally used to denote a VAC dressing which does not usually require the use of an operating theatre to perform.

Operational Procedures – Ranking Trends 2015-2020

The Top 5 operations associated with surgical deaths occurring in 2020 and their ranking over the preceding 6-year period are depicted on the following pages for: (1) General Surgery; (2) Orthopaedic Surgery; (3) Neurosurgery; (4) Vascular Surgery; (5) Cardiothoracic Surgery, and (6) Urology.

Figure 29, below, shows *Exploratory laparotomy* was the most frequent operation performed between 2015 and 2017, dropped to rank 2 in 2018 and 2019, and dropped to rank 3 in 2020.

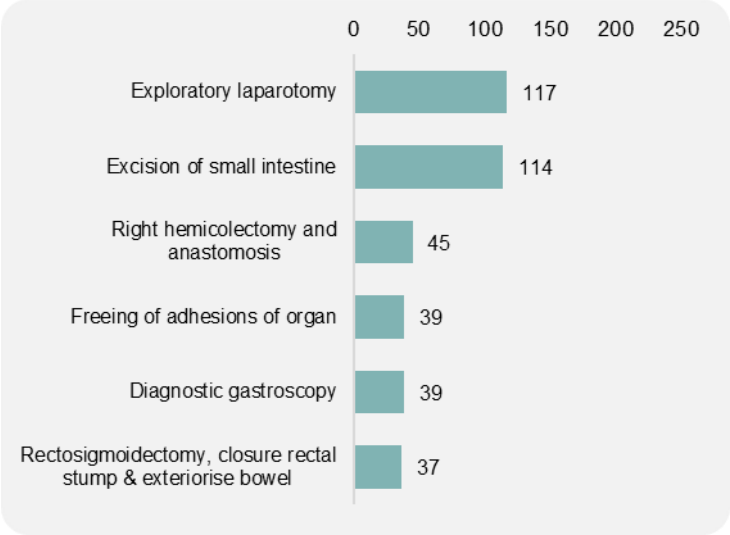
Changes in ranking for the remaining surgical specialties are shown in Figures 30 to 40.

General Surgery 2020 Ranking Trend

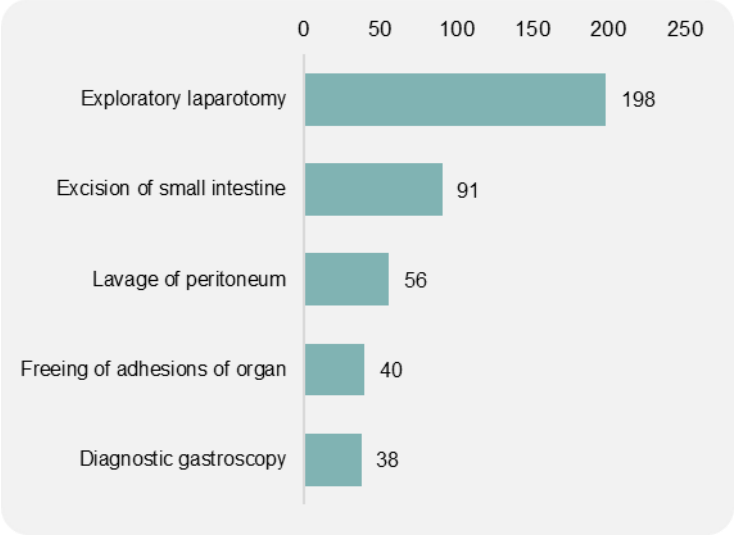
Figure 29: 6-year ranking trend of the Top 5 general surgery operations performed for 2020 deaths.

General Surgery - Top 5 Operations 2015-2020

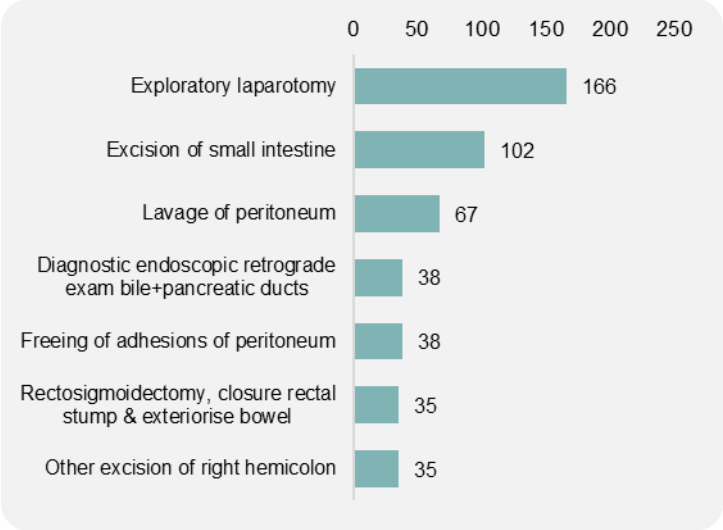
2015 – General Surgery Operations



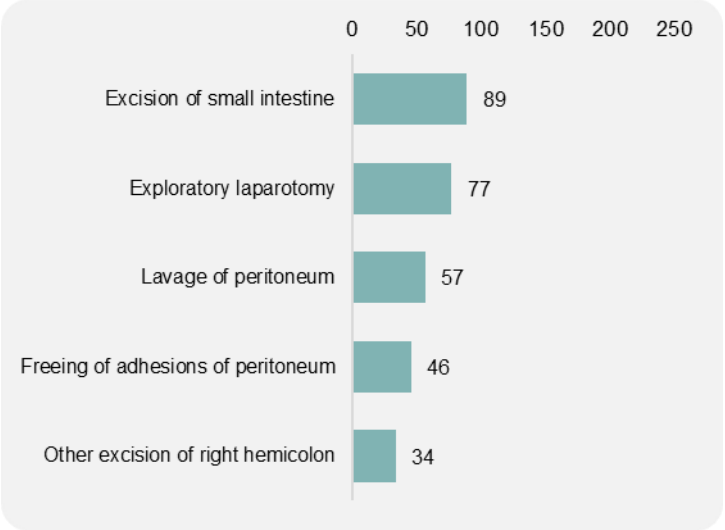
2016 – General Surgery Operations



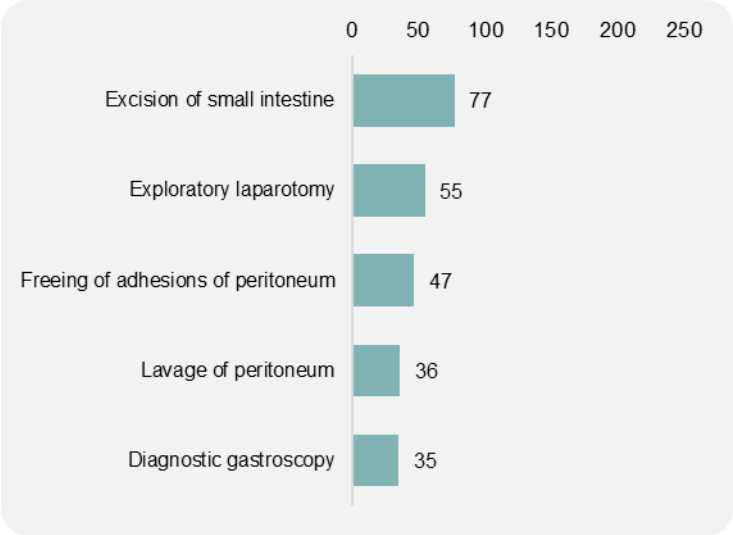
2017 – General Surgery Operations



2018 - General Surgery Operations



2019 - General Surgery Operations



2020 - General Surgery Operations

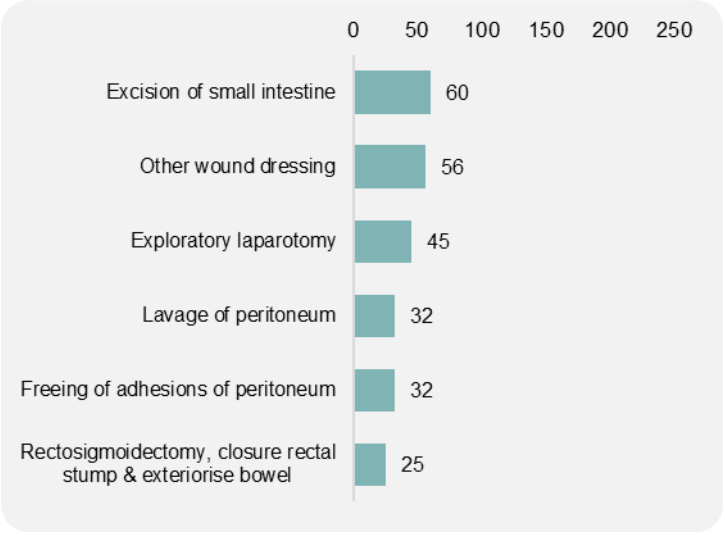


Figure 30: Top 5 general surgery operations performed by year for deaths in 2015-2020.

Orthopaedic Surgery 2020 Ranking Trend

Figure 31 shows rank 1 and 2 were unchanged over the 6-year reporting period. Rank 3 in 2020 was shared by *Open irrigation joint* and *Primary open reduction + internal fixation proximal femoral fracture + screw/nail + intramedullary device.*

The most significant changes occurred in ranks 4 and 5, *Debridement of skin* ranked 4 in 2020 had no responses for orthopaedic surgery in 2015. *Arthroscopic irrigation (not knee)* ranked 5, fluctuated over the years with the lowest response in 2017 (n=3).

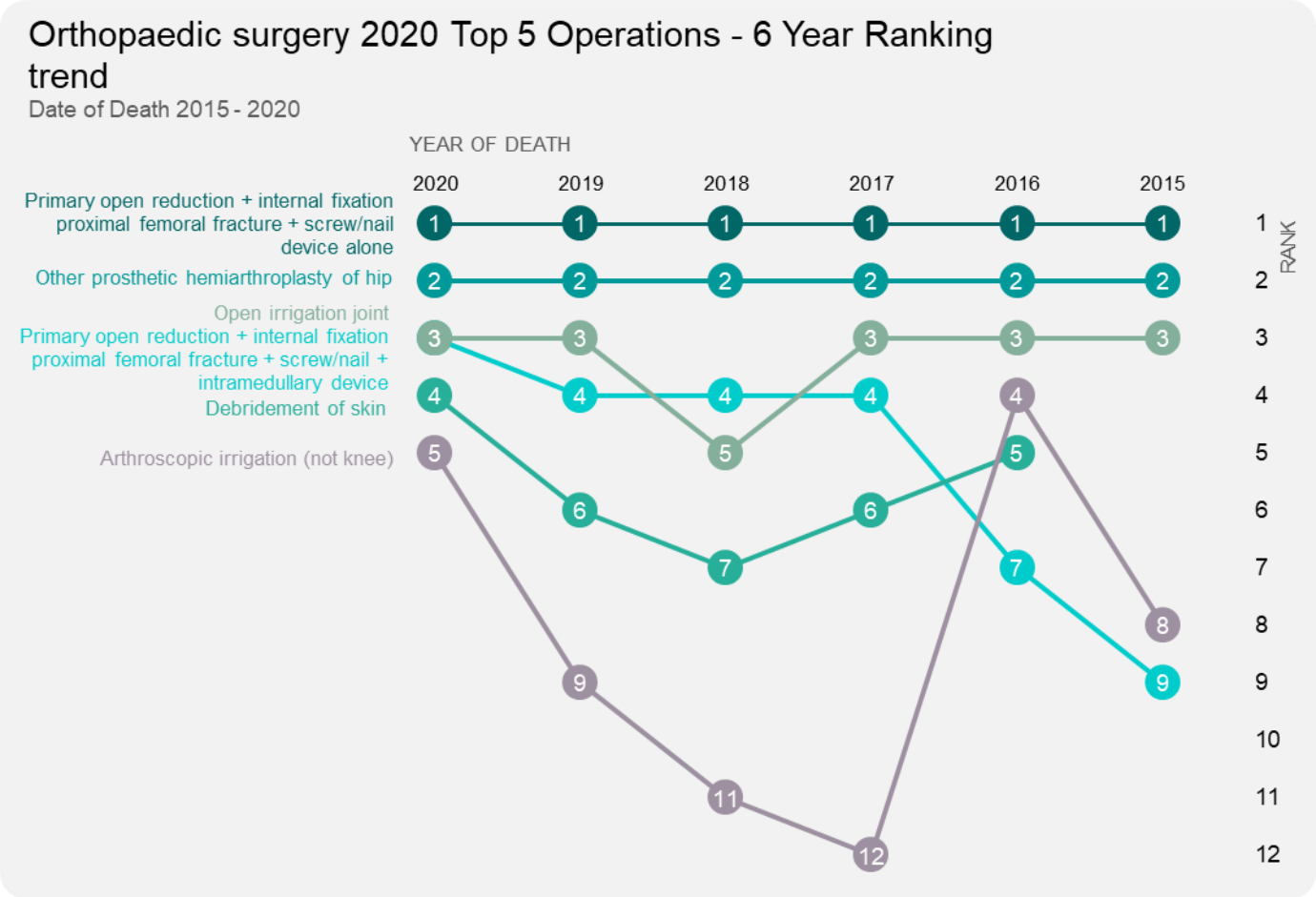
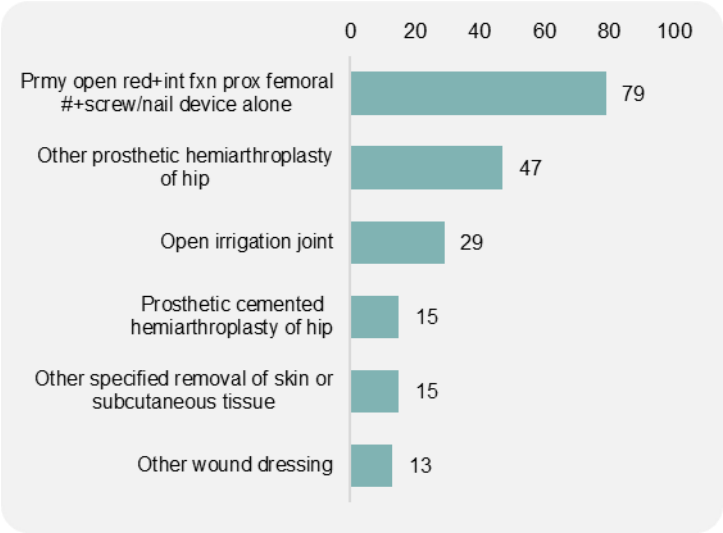


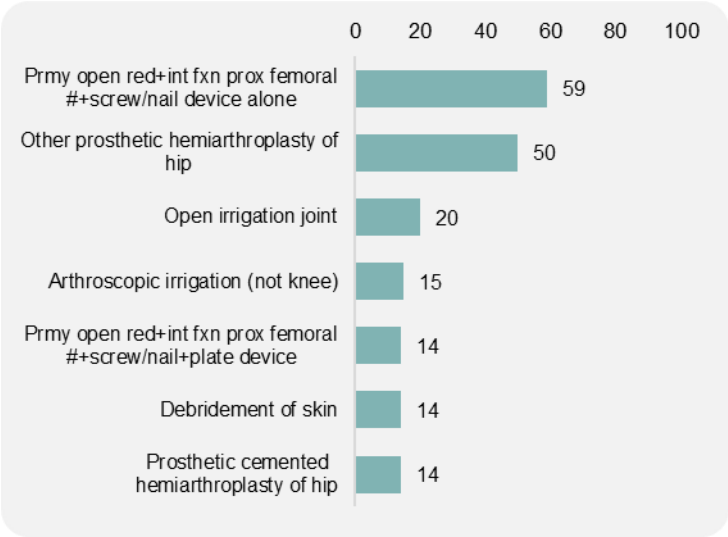
Figure 31: 6-year ranking trend of the Top 5 orthopaedic surgery operations for 2020 deaths.

Orthopaedic Surgery - Top 5 Operations 2015-2020

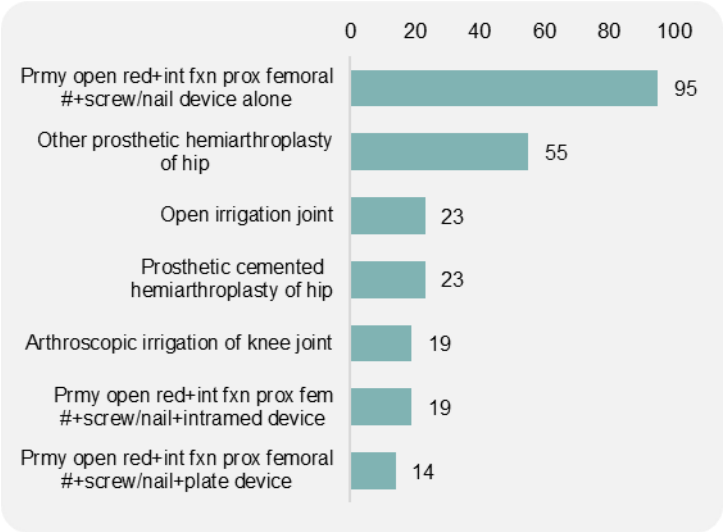
2015 – Orthopaedic Surgery Operations



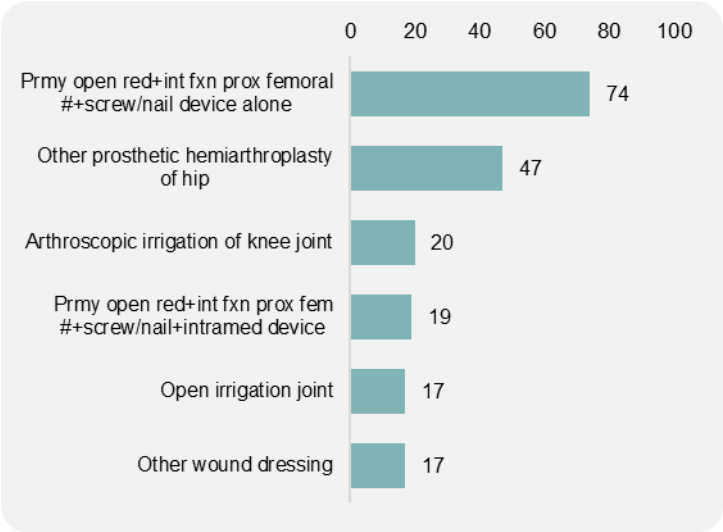
2016 – Orthopaedic Surgery Operations



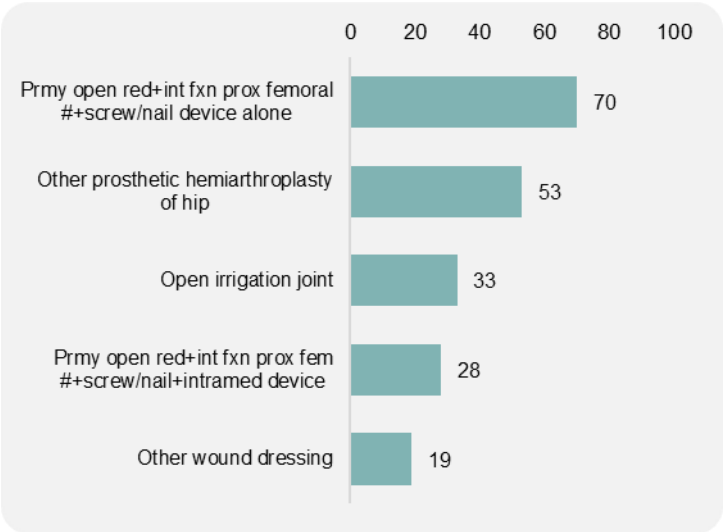
2017 – Orthopaedic Surgery Operations



2018 - Orthopaedic Surgery Operations



2019 - Orthopaedic Surgery Operations



2020 - Orthopaedic Surgery Operations

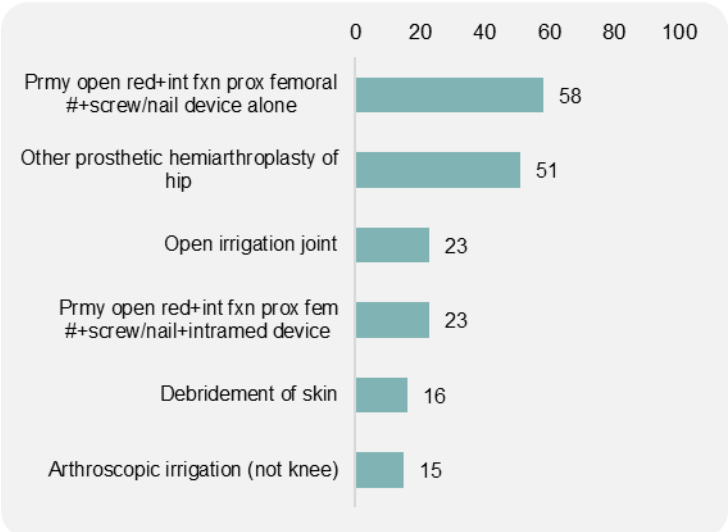


Figure 32: Top 5 orthopaedic operations performed by year for deaths in 2015-2020.

Neurosurgery 2020 Ranking Trend

Figure 33 shows rank 1 *Burrhole(s) for ventricular external drainage* was unchanged over the 6-year reporting period. In 2020 rank 2 was shared by *Evacuation of subdural haematoma* and *Supratentorial craniectomy for other / unknown,* which ranked 6 and 4, respectively, in 2015.

Drainage of ventricle of brain NEC ranked 3 in 2020 but had significant movement in the previous 5 years, with its lowest rank being 9 in 2017 (n=8) and 2015 (n=6).

Supratentorial craniectomy for traumatic intracranial haematoma ranked 5 in 2020 but had its lowest rank in 2017 (n=6) at 11.

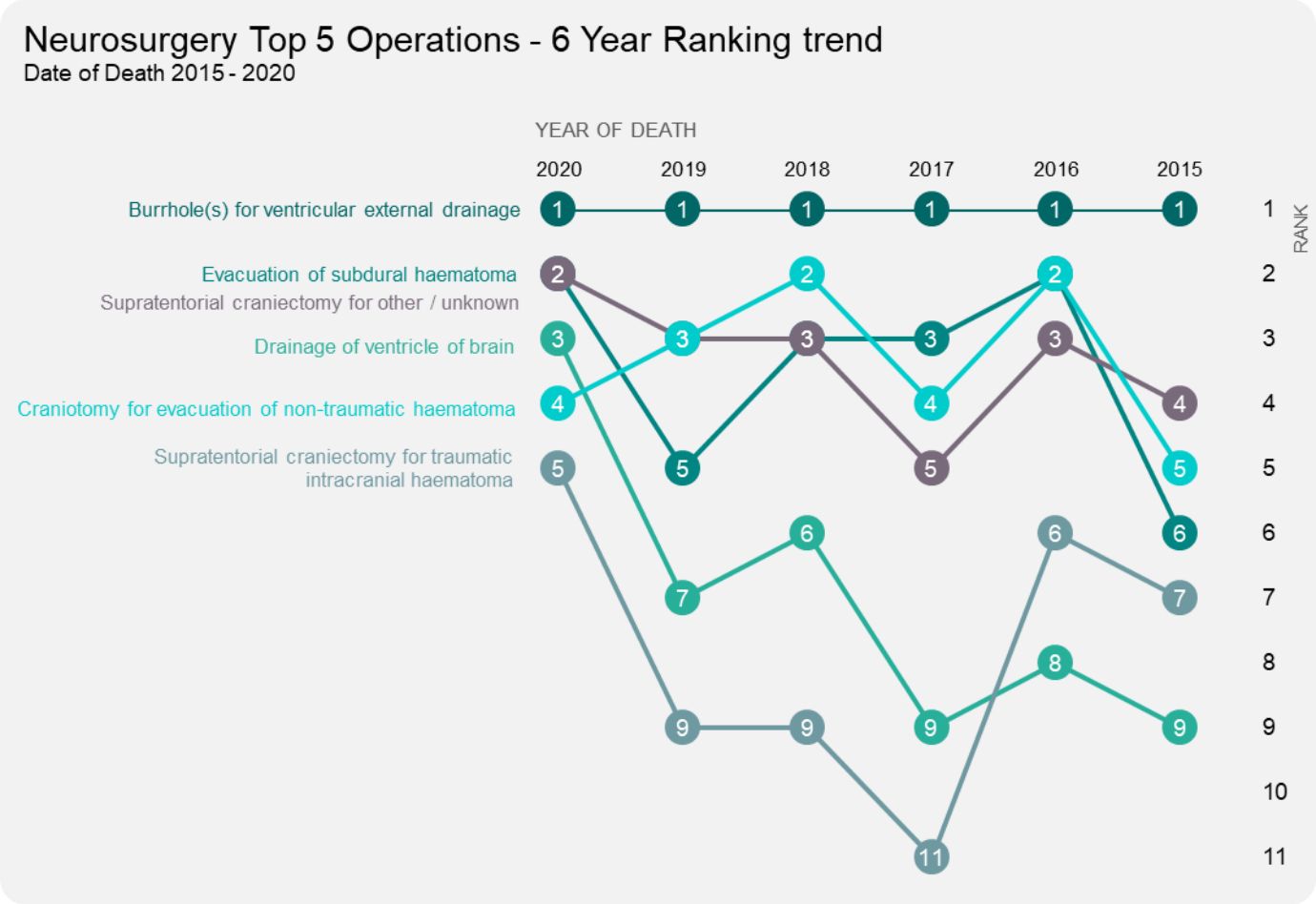
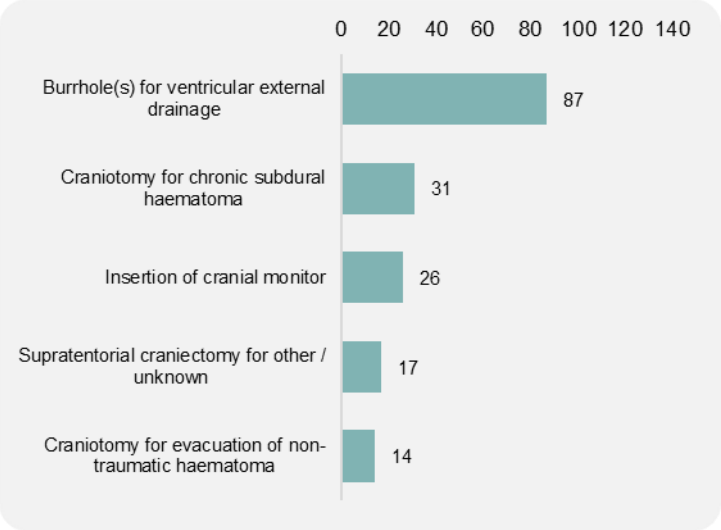


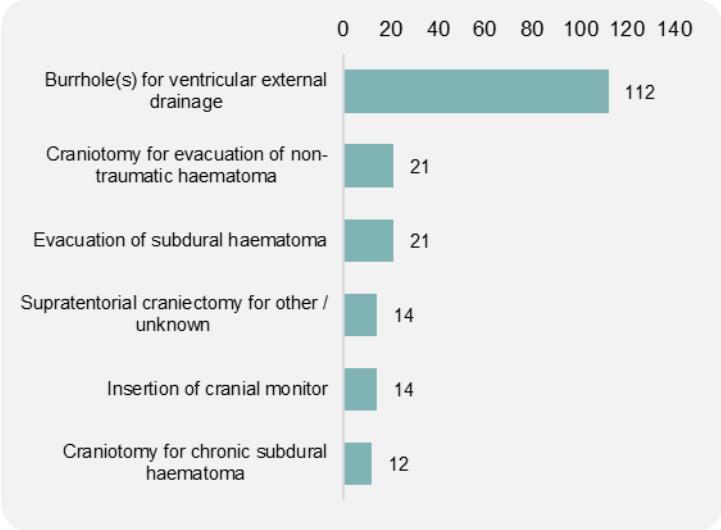
Figure 33: 6-year ranking trend of the top 5 neurosurgery operations for 2020 deaths.

Neurosurgery - Top 5 Operations 2015-2020

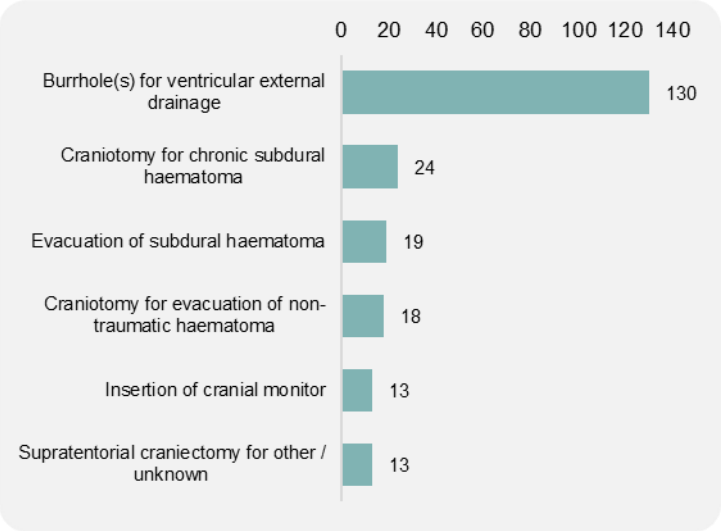
2015 – Neurosurgery Operations



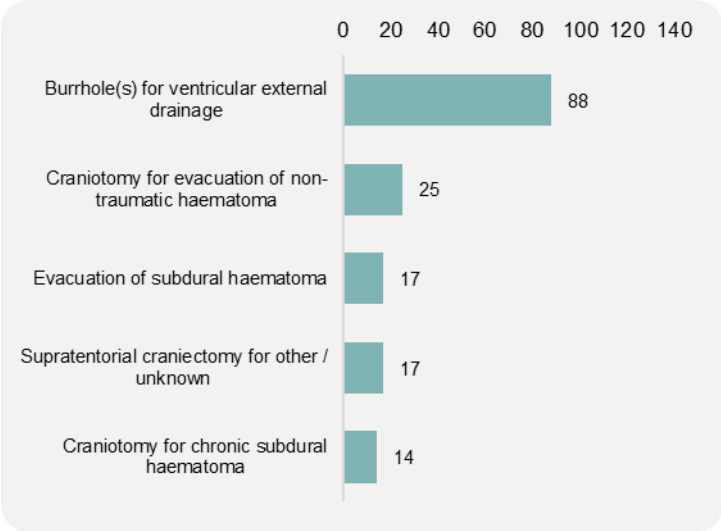
2016 – Neurosurgery Operations



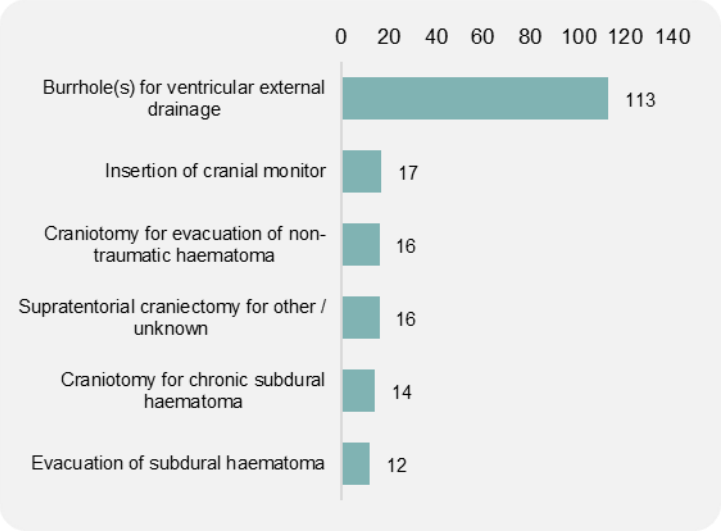
2017 – Neurosurgery Operations



2018 - Neurosurgery Operations



2019 - Neurosurgery Operations



2020 - Neurosurgery Operations

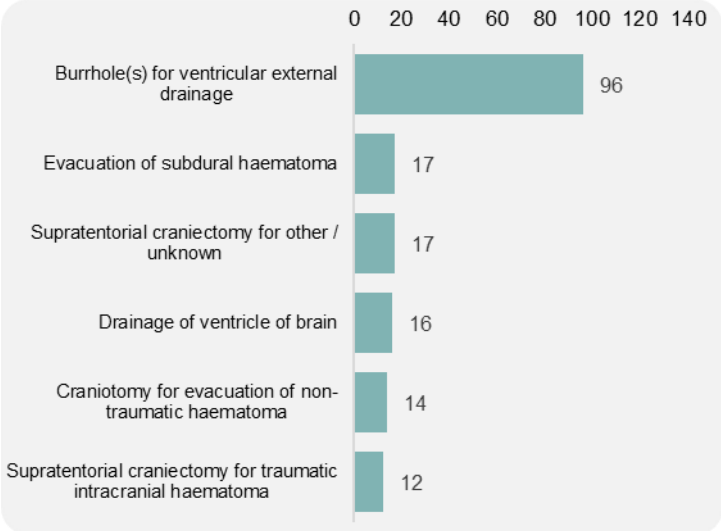


Figure 34: Top 5 neurosurgery operations performed by year for deaths in 2015-2020.

Vascular Surgery 2020 Ranking Trend

Figure 35 shows rank 1 *Other angiograms* was unchanged over the 6-year reporting period.

Percutaneous transluminal angioplasty of artery ranked 2 in 2020 (n=16) and ranked 6 in 2017 (n= 12).

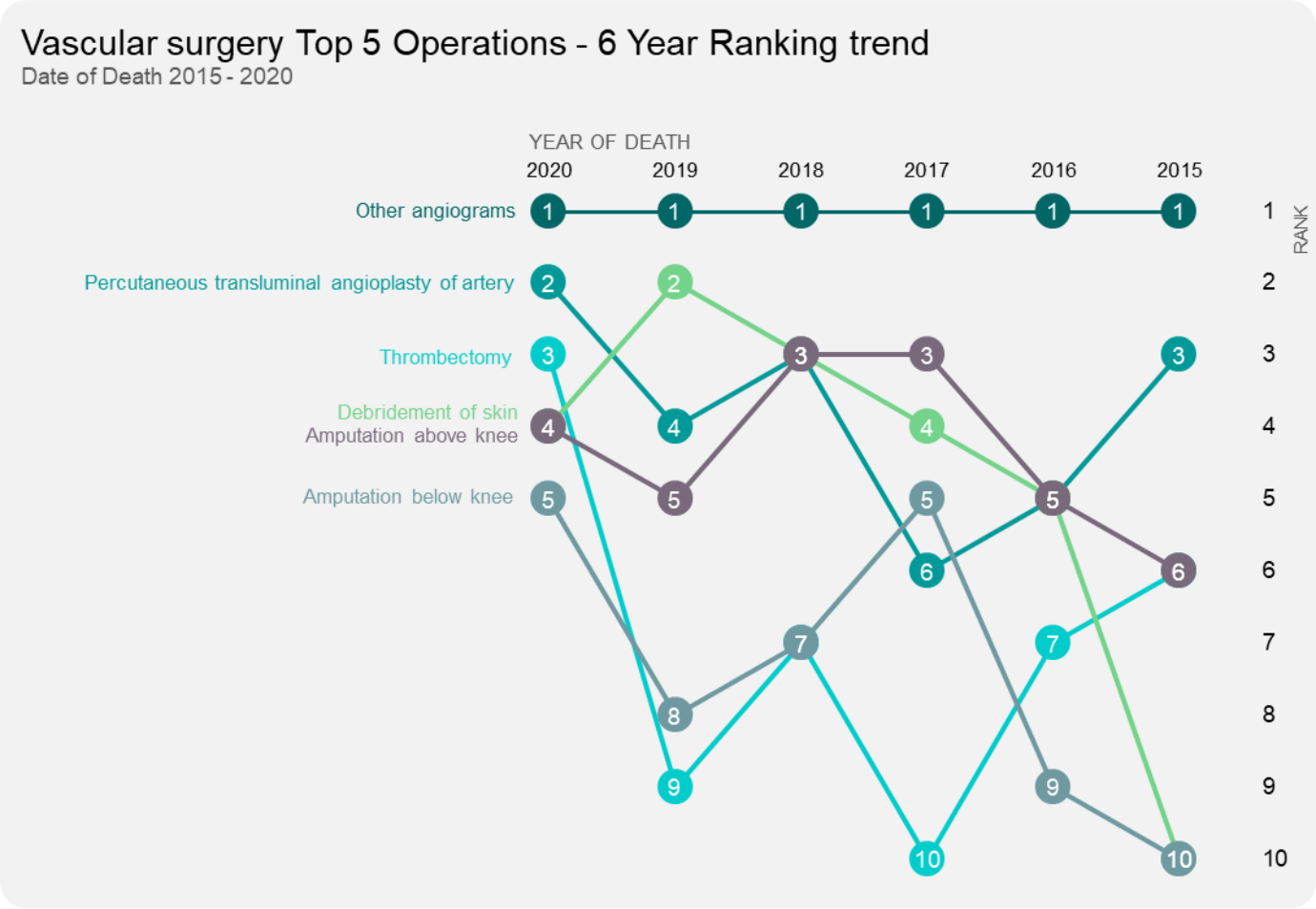
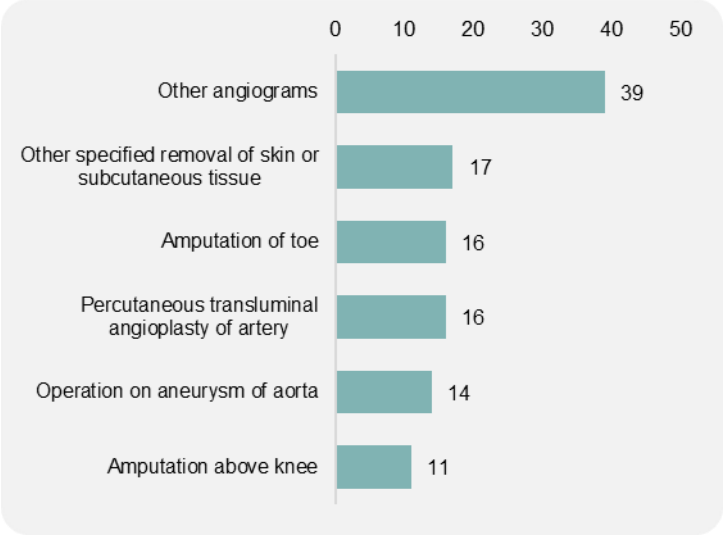


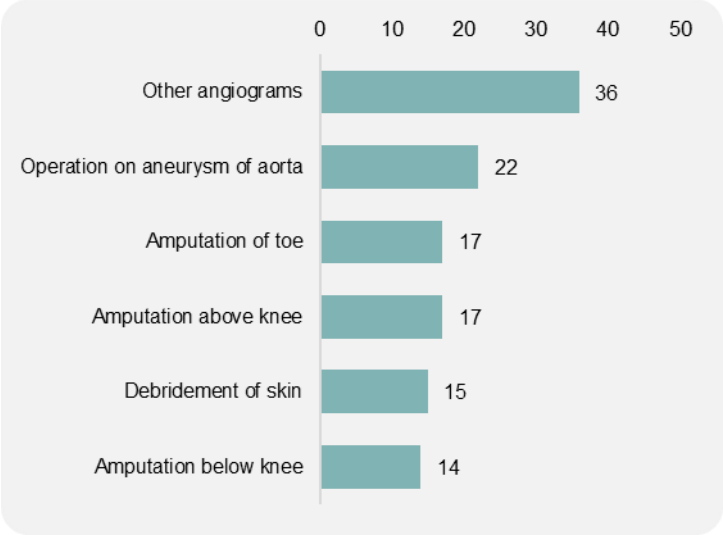
Figure 35: 6-year ranking trend of the top 5 vascular surgery operations for 2020 deaths.

Vascular Surgery - Top 5 Operations 2015-2020

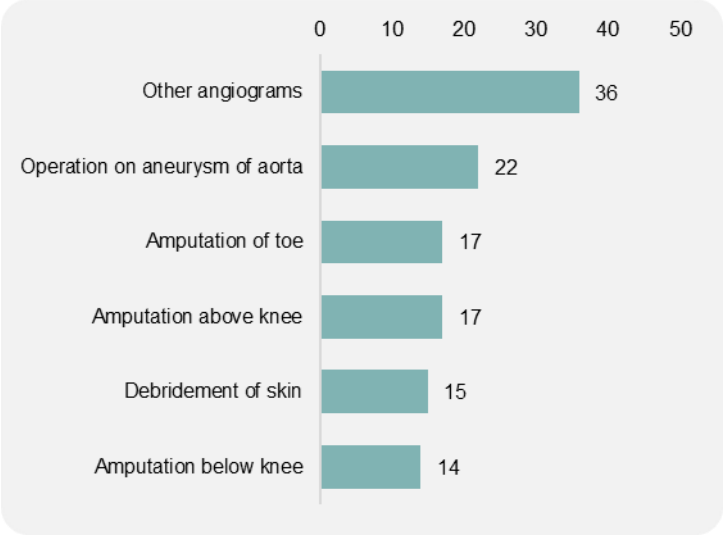
2015 – Vascular surgery Operations



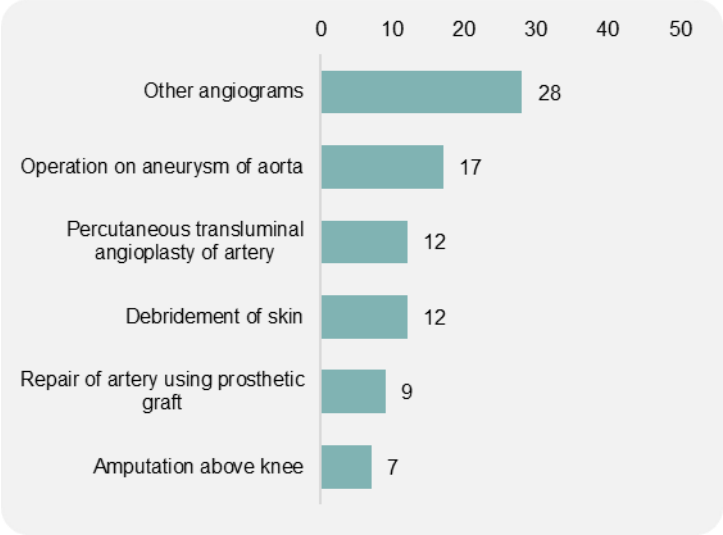
2016 – Vascular surgery Operations



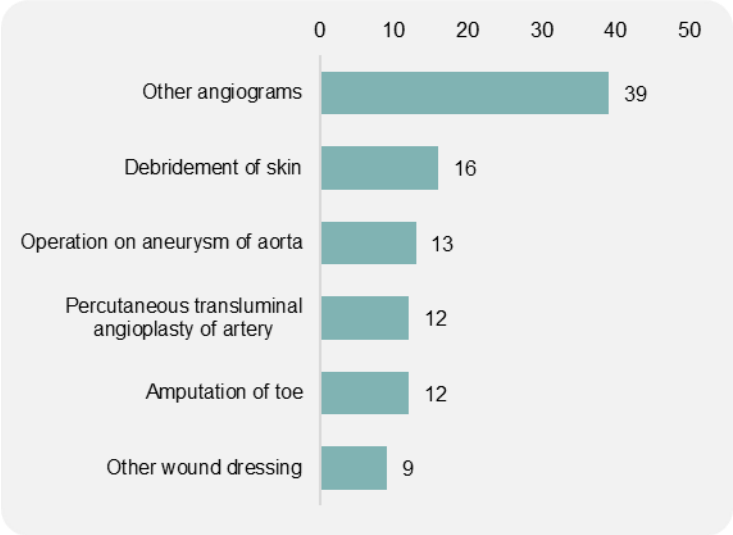
2017 – Vascular surgery Operations



2018 - Vascular surgery Operations



2019 - Vascular surgery Operations



2020 - Vascular surgery Operations

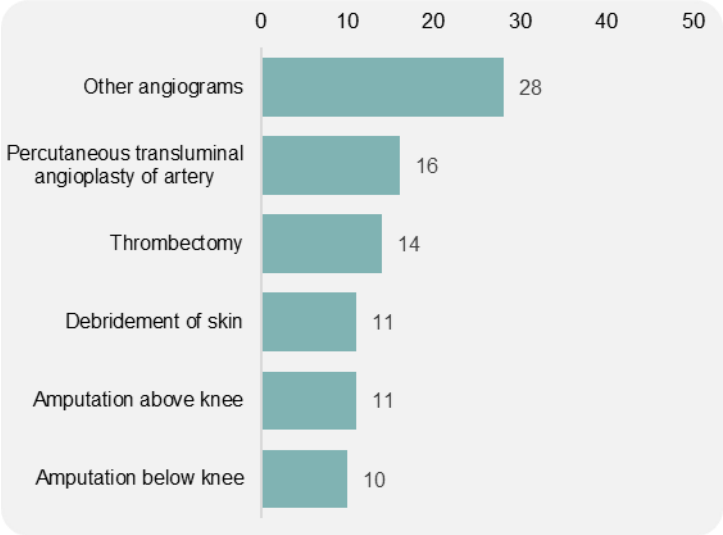


Figure 36: Top 5 vascular surgery operations performed by year for deaths in 2015-2020.

Cardiothoracic Surgery 2020 Ranking Trend

Figure 37 shows rank 2 *Extra corporeal membrane oxygenation* in 2020 (n=19) was consistently ranked 1 in the previous 4 years, with 2019 showing the highest value (n=33).

Rank 4 in 2020 was held jointly by *Drainage of pericardium, Other bypass of coronary artery, Replacement of mitral valve*. Of the three, *Other bypass of coronary artery* consistently ranked higher with its highest value in 2017 (n=19).

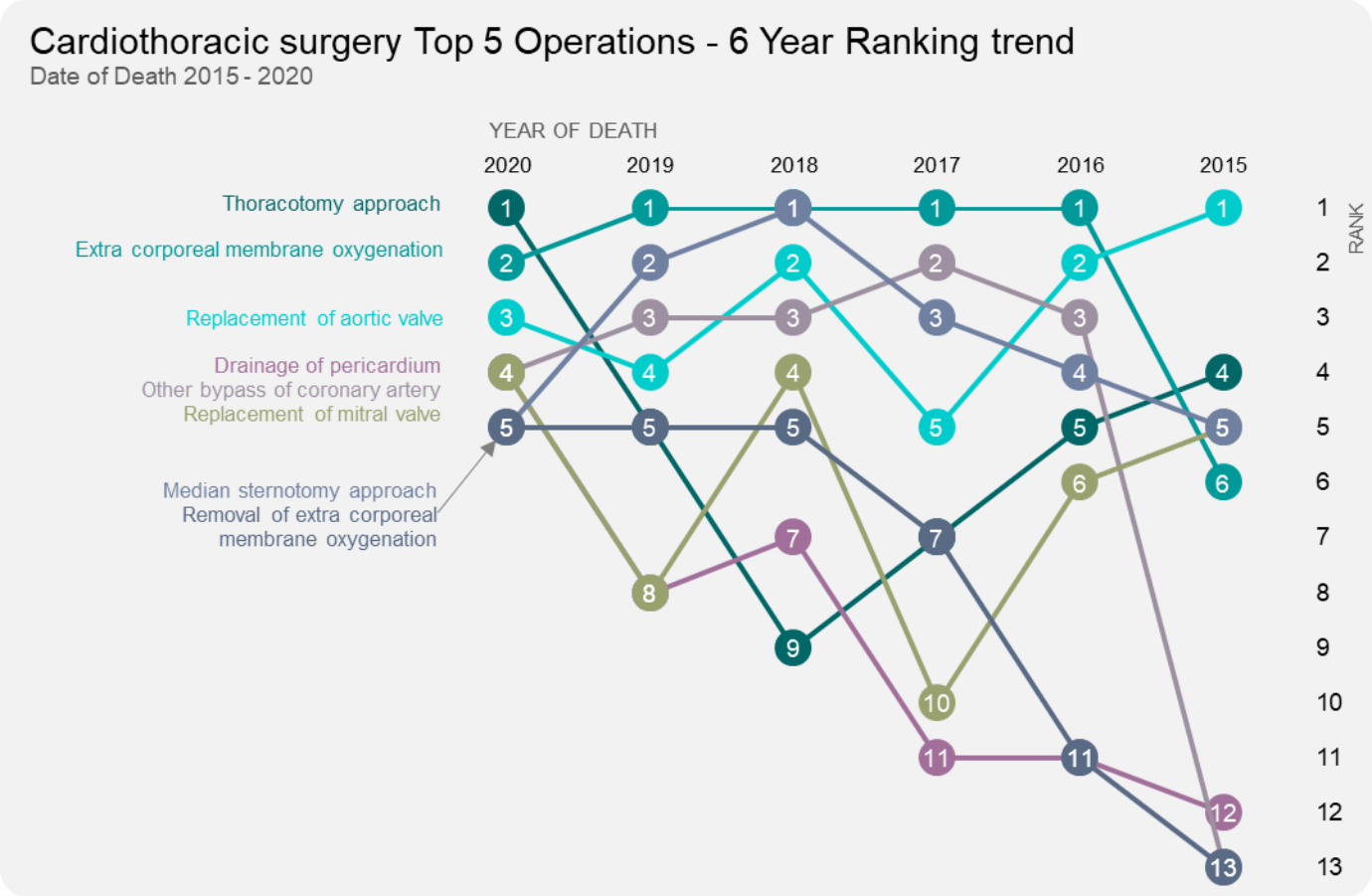
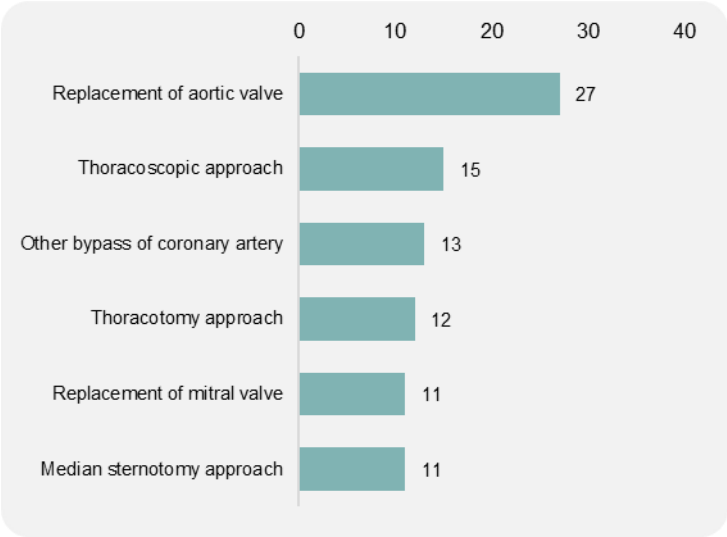


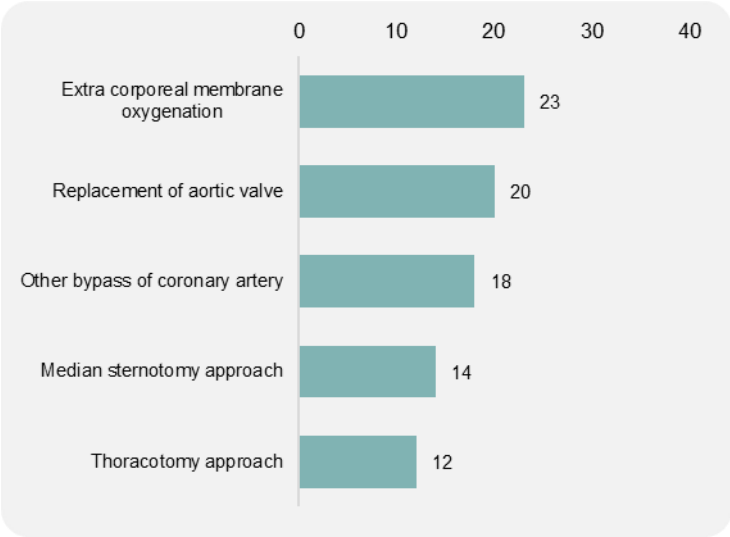
Figure 37: 6-year ranking trend of the top 5 cardiothoracic surgery operations for 2020 deaths.

Cardiothoracic Surgery - Top 5 Operations 2015-2020

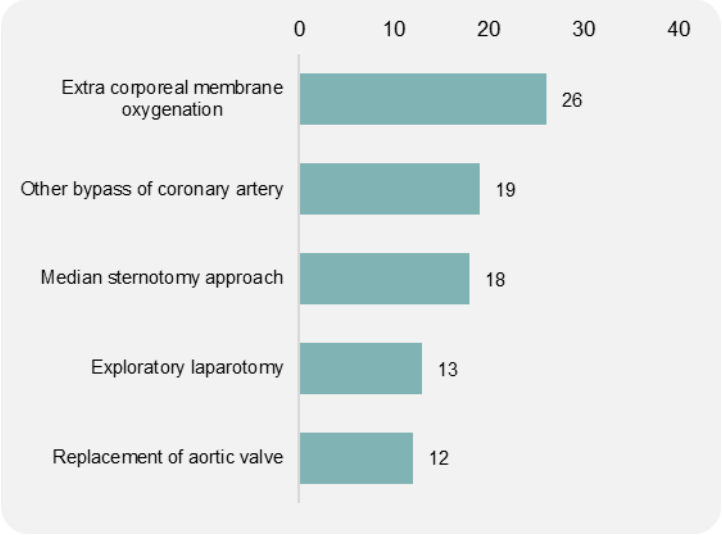
2015 – Cardiothoracic surgery Operations



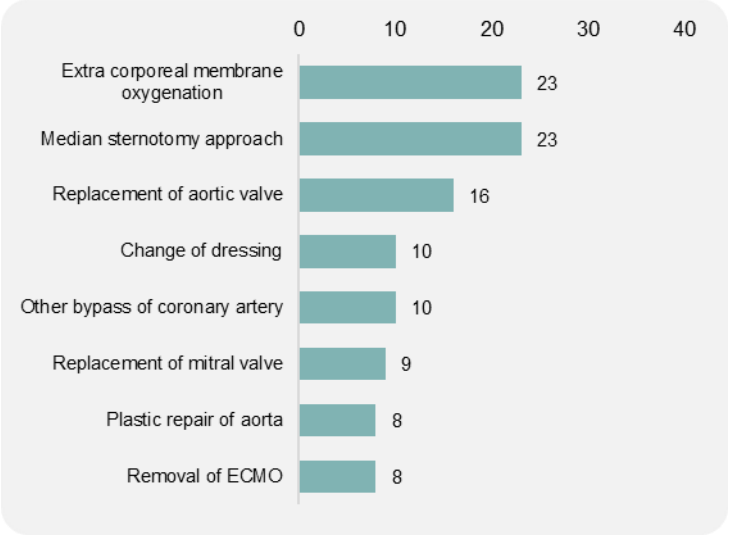
2016 – Cardiothoracic surgery Operations



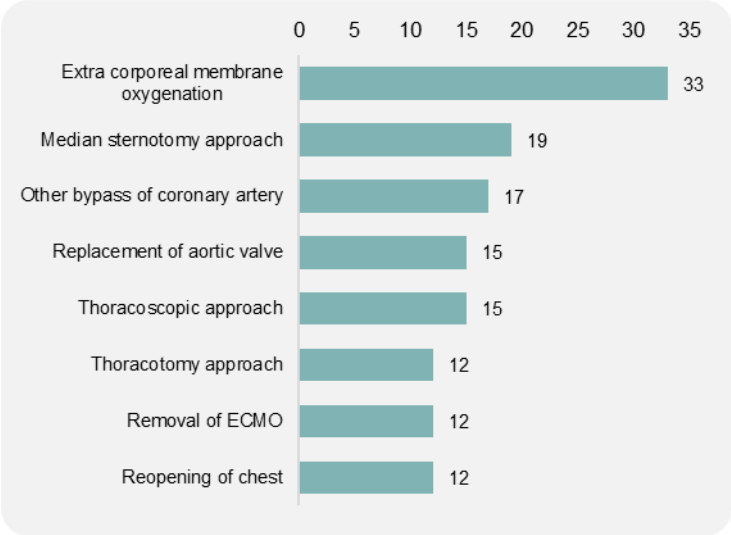
2017 – Cardiothoracic surgery Operations



2018 - Cardiothoracic surgery Operations



2019 - Cardiothoracic surgery Operations



2020 - Cardiothoracic surgery Operations

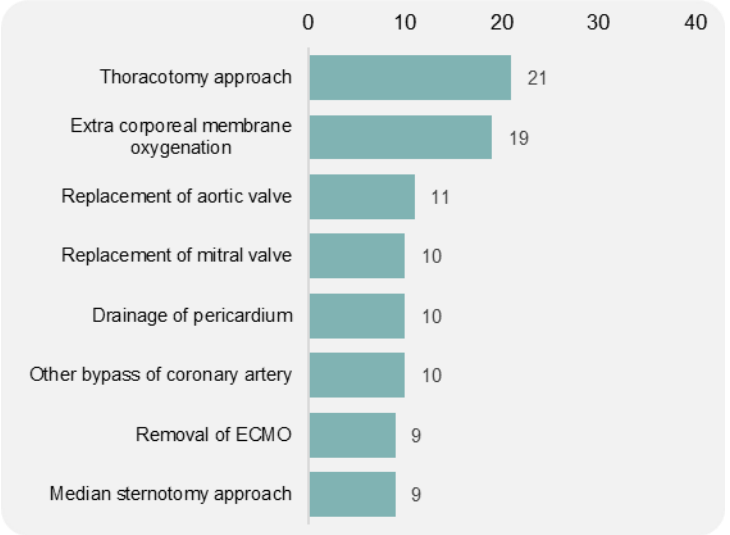


Figure 38: Top 5 cardiothoracic surgery operations performed by year for deaths in 2015-2020.

Urological Surgery 2020 Ranking Trend

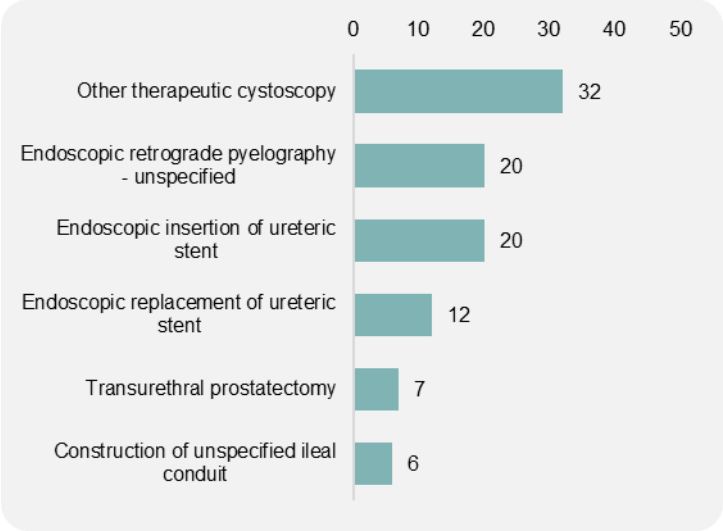
Figure 39 shows rank 1 *Other therapeutic cystoscopy* in 2020 (n=31), dropping to rank 3 in 2016 (n=26) and back to rank 1 in 2015 (n=32).

Diagnostic cystoscopy ranked 5 in 2020 but ranked 2 in 2016 with its highest value (n=27).

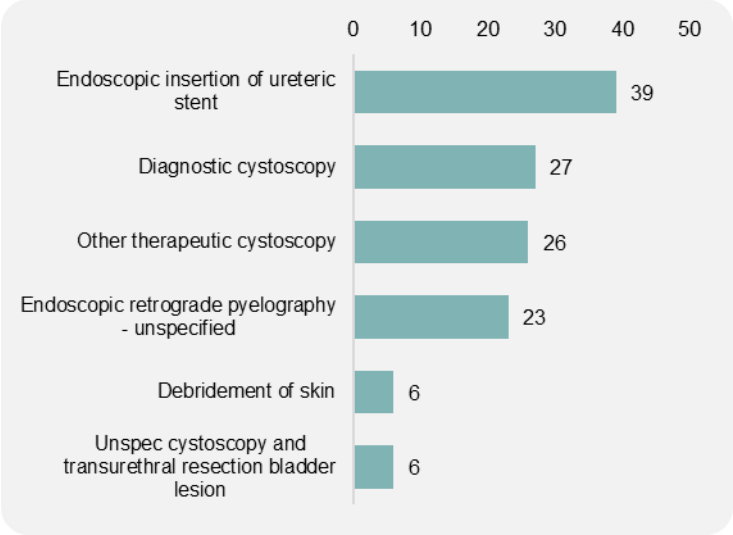
Figure 39: 6-year ranking trend of the top 5 urological surgery operations for 2020 deaths.

Urological Surgery - Top 5 Operations 2015-2020

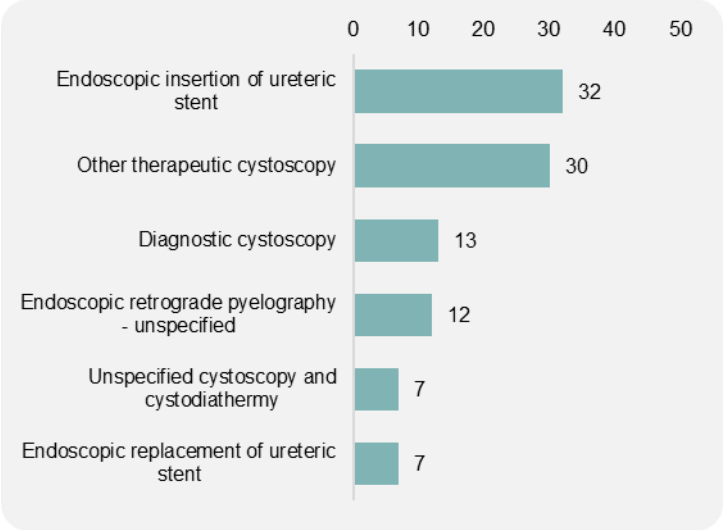
2015 – Urological surgery Operations



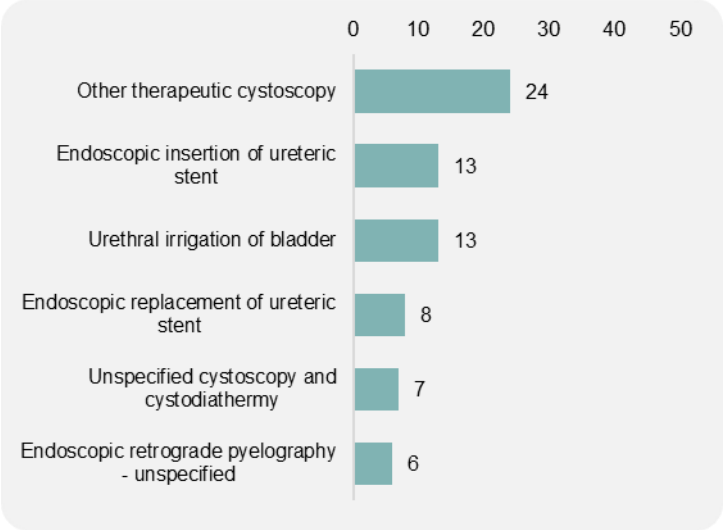
2016 – Urological surgery Operations



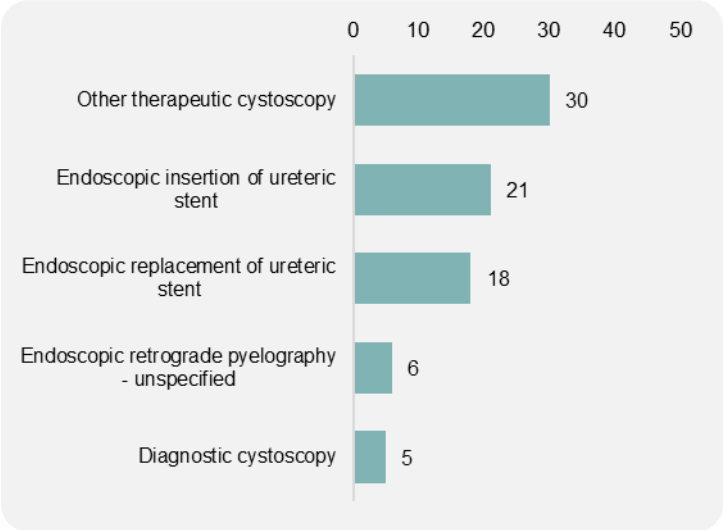
2017 – Urological surgery Operations



2018 - Urological surgery Operations



2019 - Urological surgery Operations



2020 - Urological surgery Operations

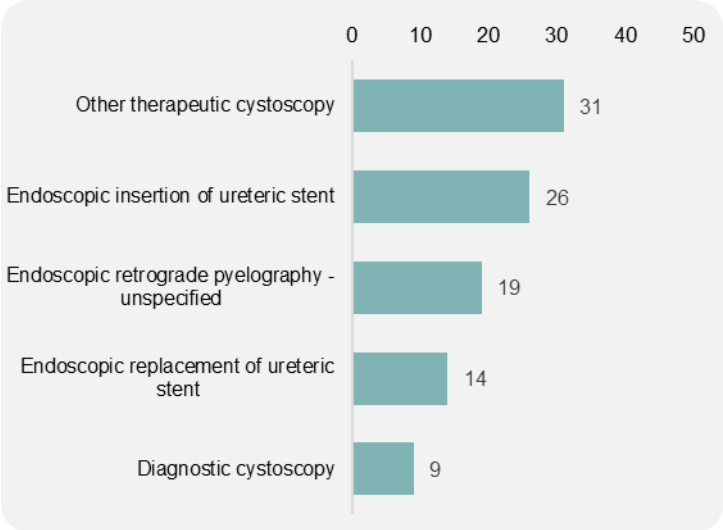


Figure 40: Top 5 urological surgery operations performed by year for deaths in 2015-2020.

Post-operative Complication – Trend Data 2015-2020

The surgical case form contains a series of questions pertaining to post-operative complications with the parent question being: *Was there a definable post-operative complication?* Of the 9,889 surgical case forms submitted for the 6-year reporting period 23.34% (n=2,308) confirmed post-operative complication occurred.

Figure 41 below compares the post-operative complication responses by year and shows that 2020 has the highest percentage of responses for “no post-operative complication” (66%; n=894), which is also higher than the average of 62%.

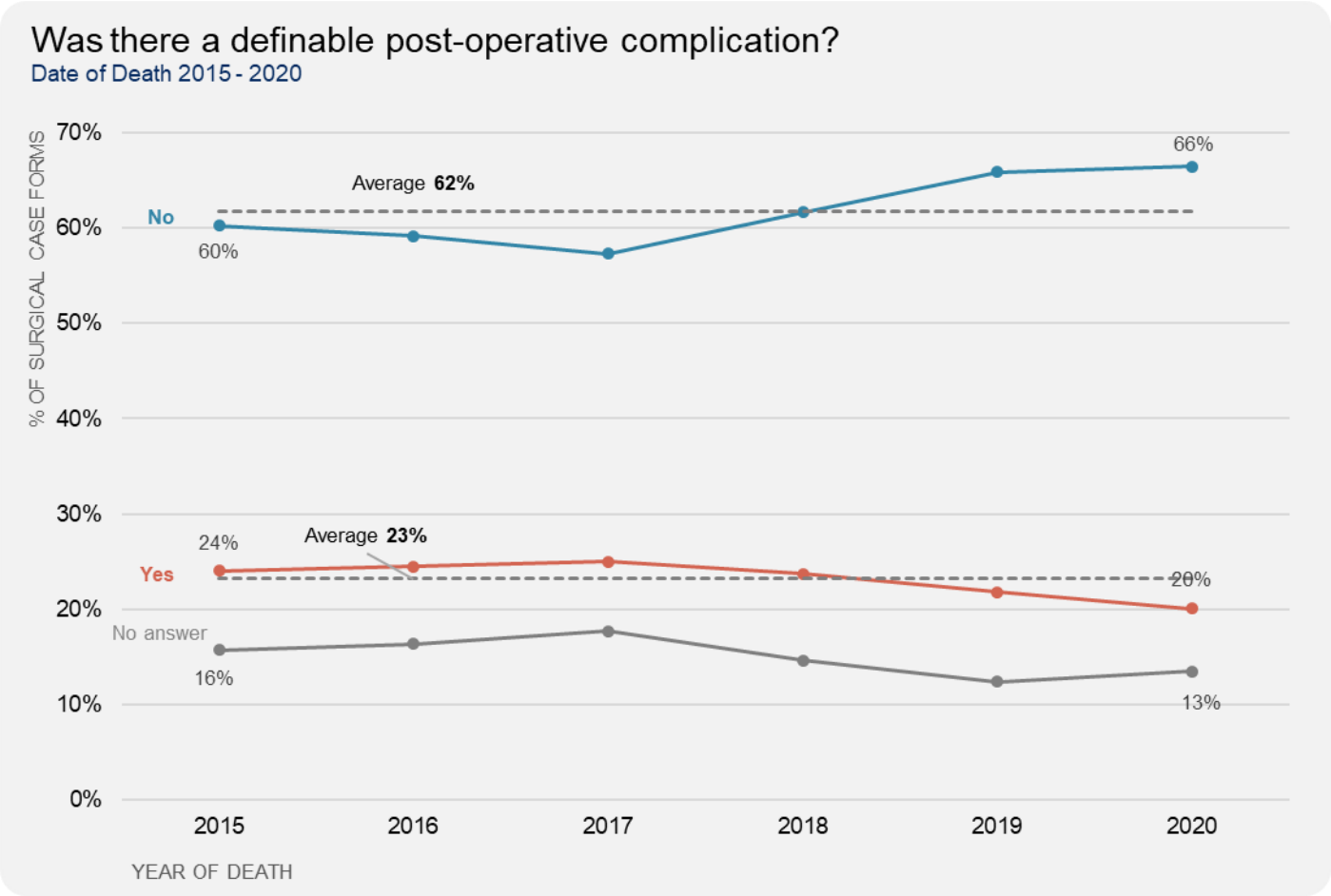


Figure 41: Percentage of post-operative complication responses by year 2015-2020.

Delay in Recognition – Post-operative Complications

When a surgeon selects “yes” to the question: *Was there a definable post-operative complication?* they must then respond to: *Was there a delay in recognising post-operative complications?*

Over the 6-year reporting period 2,308 responses confirmed post-operative complication, of which 124 (5.37%) responses confirmed a delay in recognising post-operative complication. Figure 42 depicts a total of 1,924 responses confirmed no delay to recognising a post-operative complication. The highest response was in 2017 (n=360) and the lowest in 2020 (n=253).

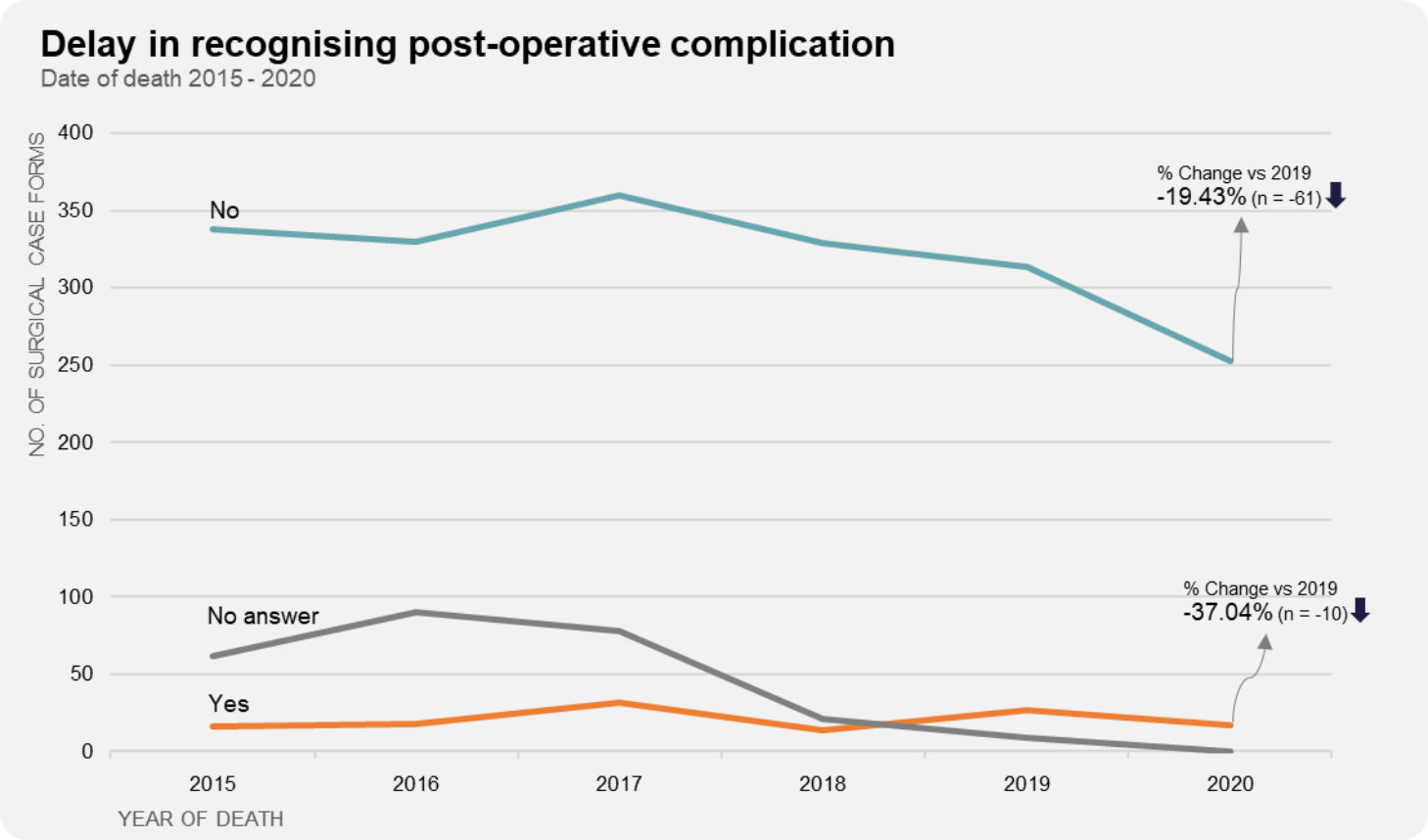


Figure 42: Delay in recognising post-operative complication by year 2015-2020.

Post-operative Complications – Comparative Data 2019-2020

When a surgeon confirms there is a definable post-operative complication, they are asked to make a selection from a number of pre-populated 'possible complications' indicating the type of post-operative complication related to the admission, such as: *procedure-related sepsis* or *significant post-operative bleeding.* Figure 43 below displays a comparison of surgeons' responses for 2019 and 2020.

A breakdown of the 'other' category responses is provided in the next page in Figure 44.

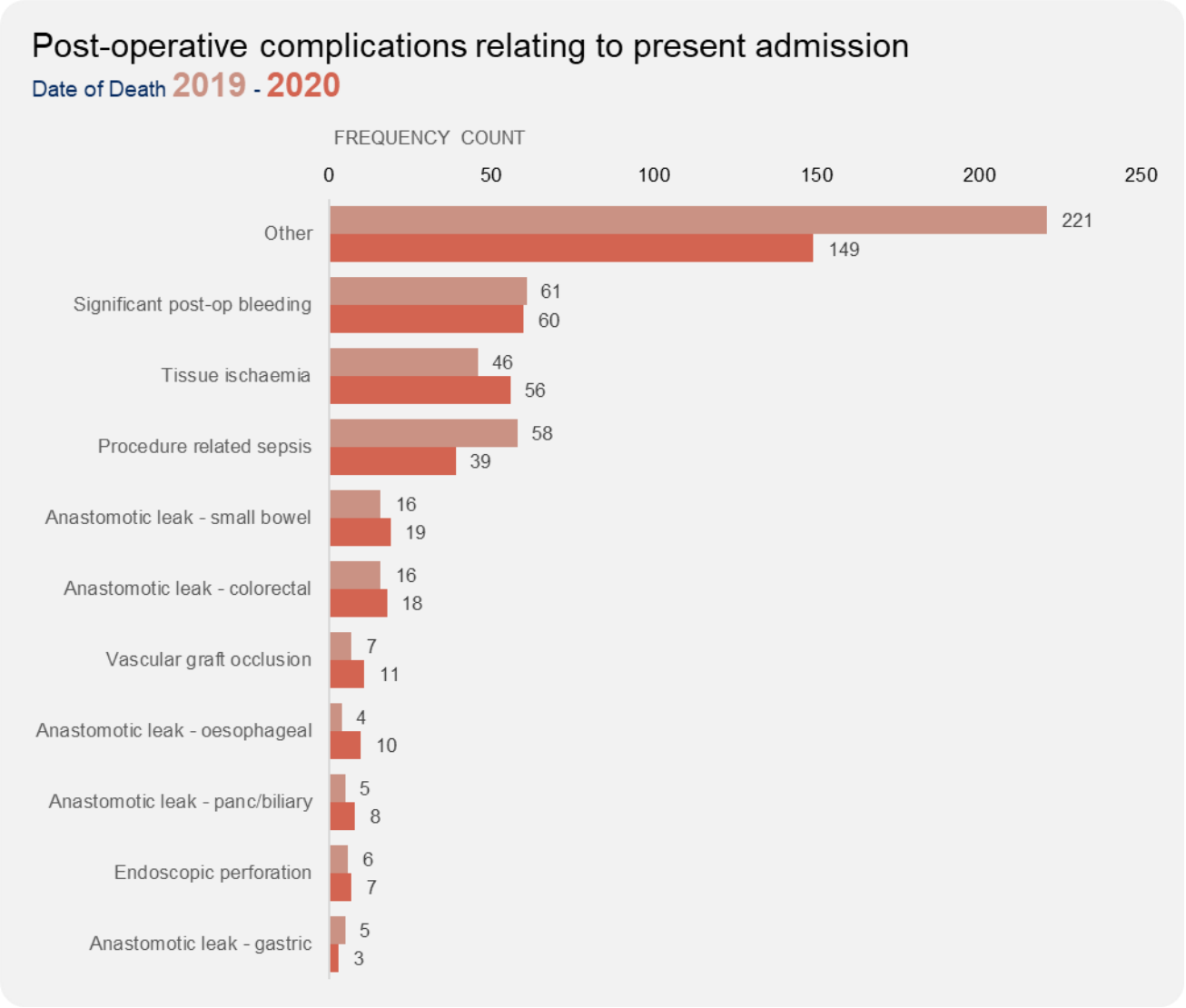


Figure 43: Comparative breakdown of post-operative complications for deaths in 2019-2020.

A breakdown of the ‘other’ category responses is provided in Figure 44 below. Generalised categories were used to collate these responses. For example, ‘Respiratory issues’ (n=73) includes such issues as: Lung collapse, Pneumonia, Pleural effusion. Pneumothorax and Respiratory failure. Over half of the ‘other’ category responses were for General Surgery and Cardiothoracic Surgery procedures, which is more of an indication that the complication was not listed in the pre-populated options.

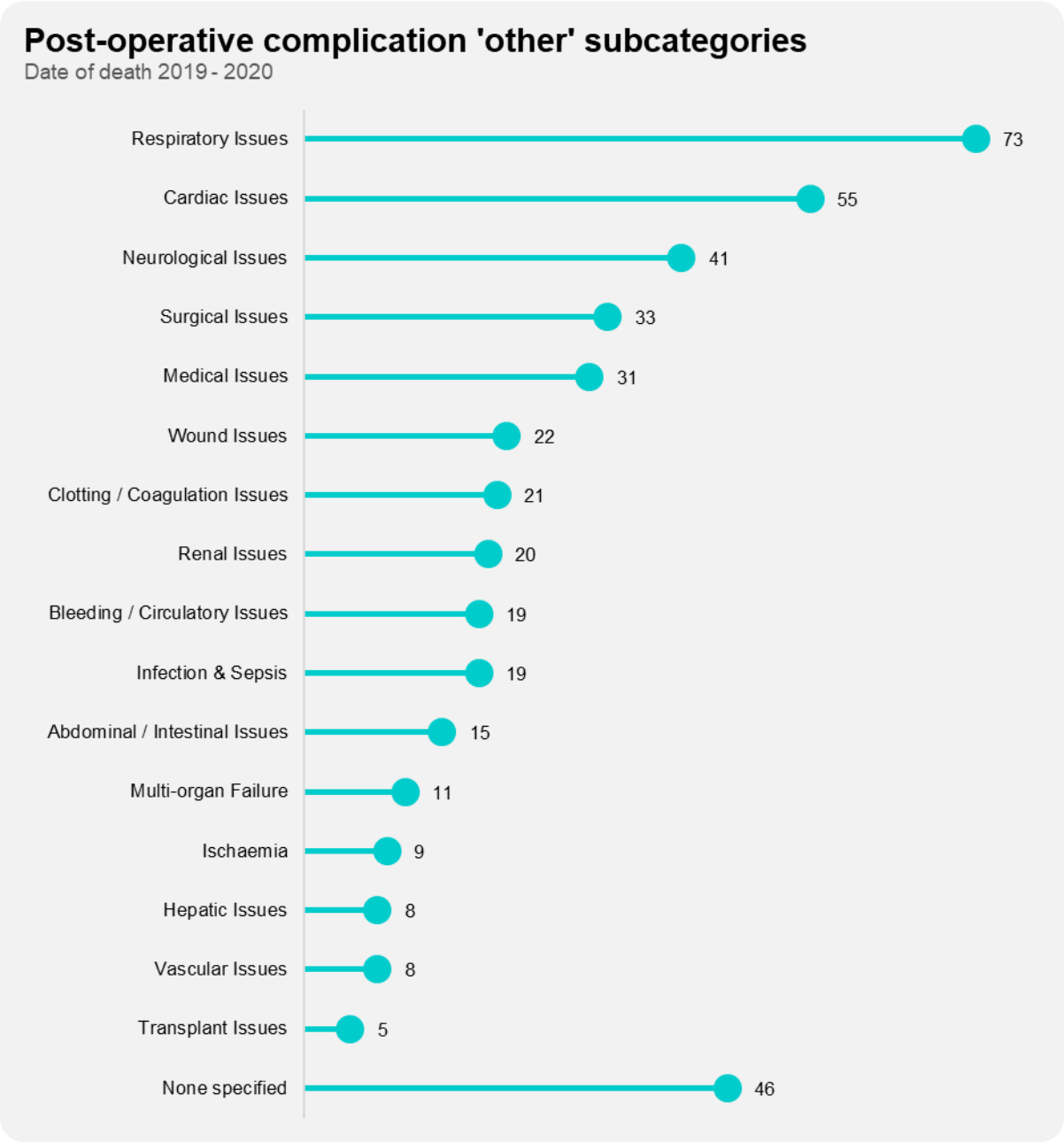
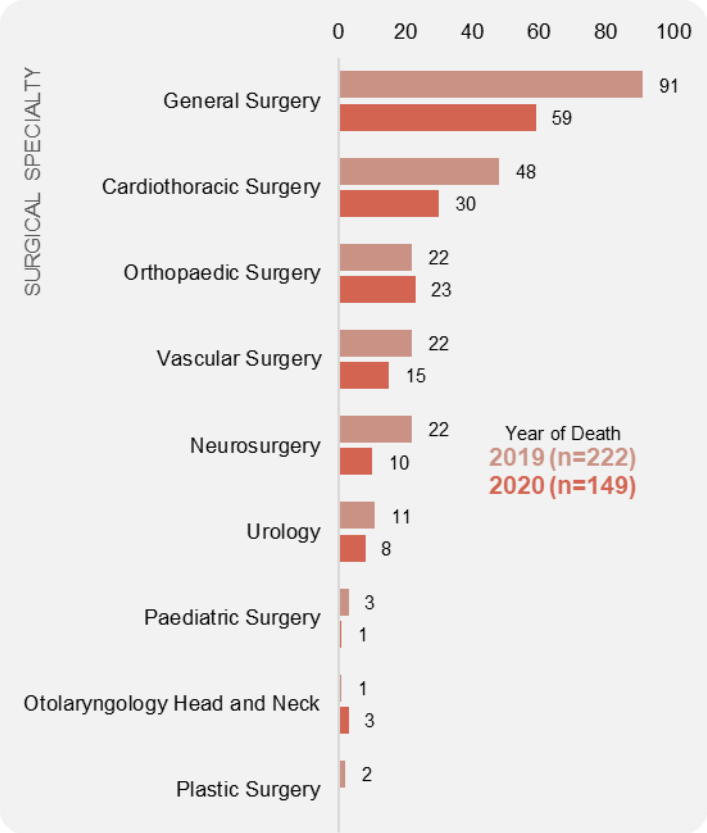


Figure 44: Distribution of issues from thematic analysis of ‘other’ category for deaths in 2019-2020.

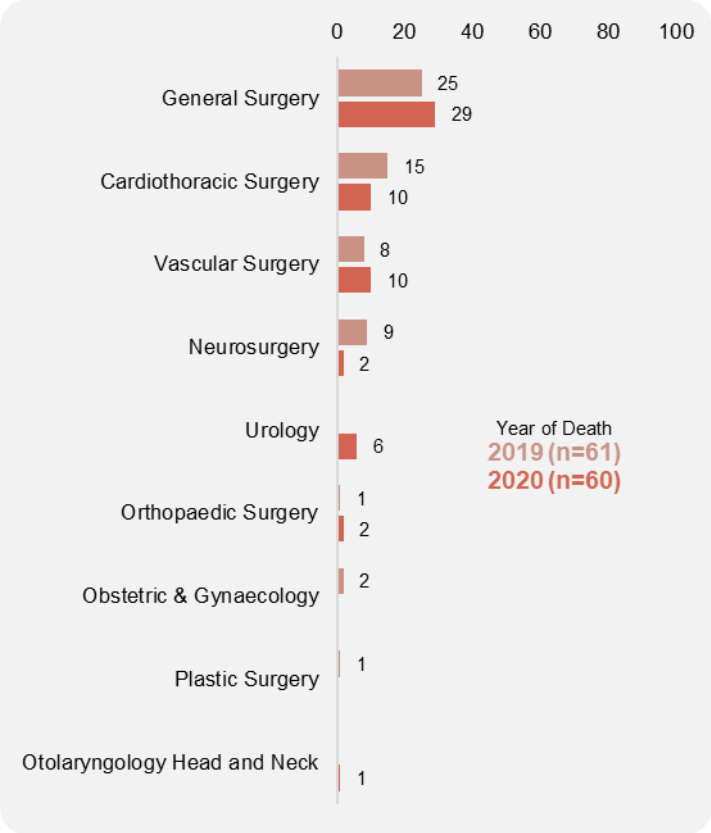
Note: The frequency count for “Other” was expanded by 20 (n=390) due to multiple complications being listed in the free-text box for Q16.

A comparative breakdown of frequency counts by specialty for the Top 4 post-operative complications for 2019:2020 is displayed in Figure 45 below. General Surgery complications are consistently ranked first, however, that specialty also has the highest number of cases submitted to CHASM annually.

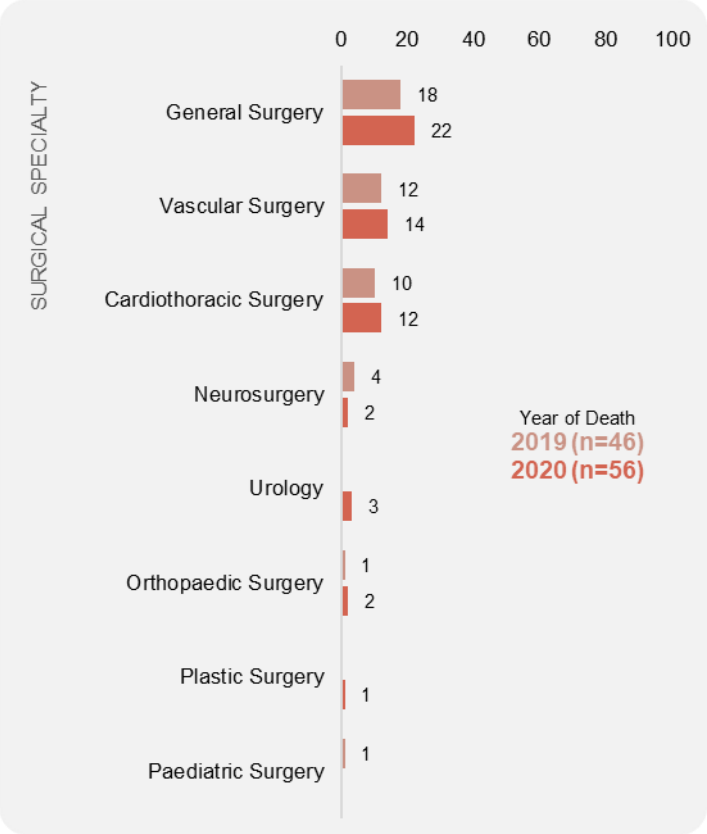
Other



Significant post-op bleeding



Tissue ischaemia



Procedure related sepsis

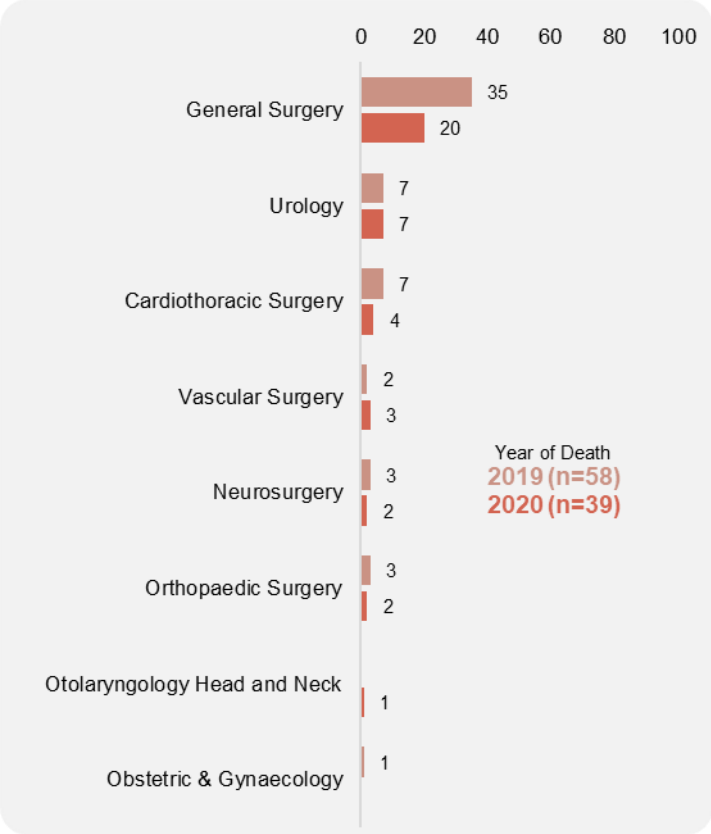


Figure 45: Comparative breakdown of Top 4 complications by specialty for deaths in 2019-2020.

Patient Risk Factors – Trend Data 2015-2020

ASA Classification

The American Society of Anesthesiologists (ASA) Physical Status Classification System[11] has been used for over 60 years to assess, communicate and grade patients according to their pre-anaesthesia health (co-morbidities) to assist in predicting peri-operative risk factors.

CHASM data often represents patients with multiple medical co-morbidities, or the highest risk factors, presenting as emergency surgical cases. Over the 6-year reporting period a total of 9,300 (94.04%) surgical case forms were submitted with an ASA classification (Figure 46). Of these, 46.81% (n=4,353) assessed the patient as ASA 4, meaning; *a patient with severe systemic disease that is a constant threat to life*. Almost one quarter (23.96%; n=1,043) of these patients were also classified as 'emergency surgery', meaning; *delay in the treatment of the patient would lead to a significant increase in the threat of life or body part.*

Further analysis on this data set compares Emergency Surgery against Non-Emergency Surgery to present the percentage of Emergency Surgery, as shown in Figure 47 below. A total of 2,139 responses indicating Emergency Surgery were submitted, with 23.96% (n=1,043) of patients classified as ASA 4 and 18.16% (n=540) as ASA 3.

Surgical case form breakdown by ASA grade

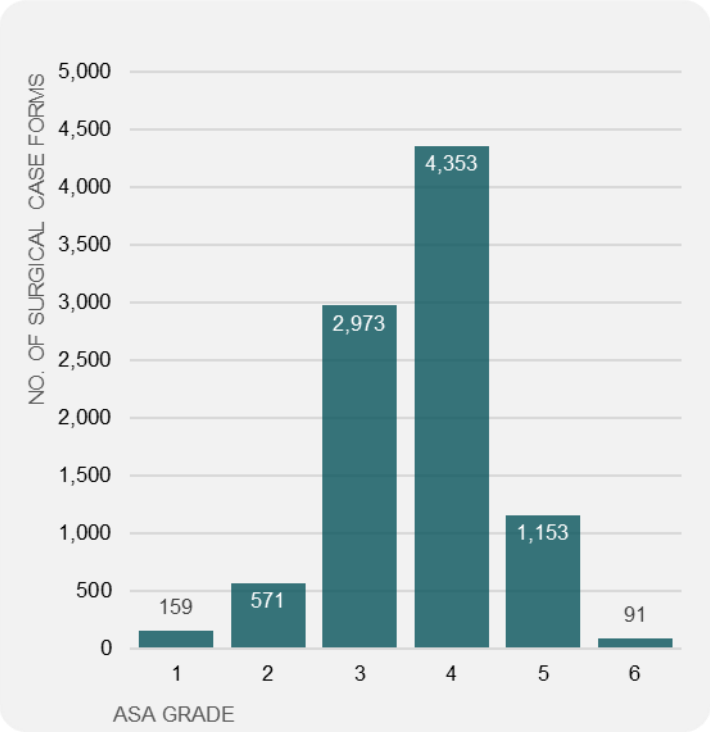


Figure 46: Case forms by ASA grade 2015-2020.

Percentage of Emergency Surgery by ASA grade

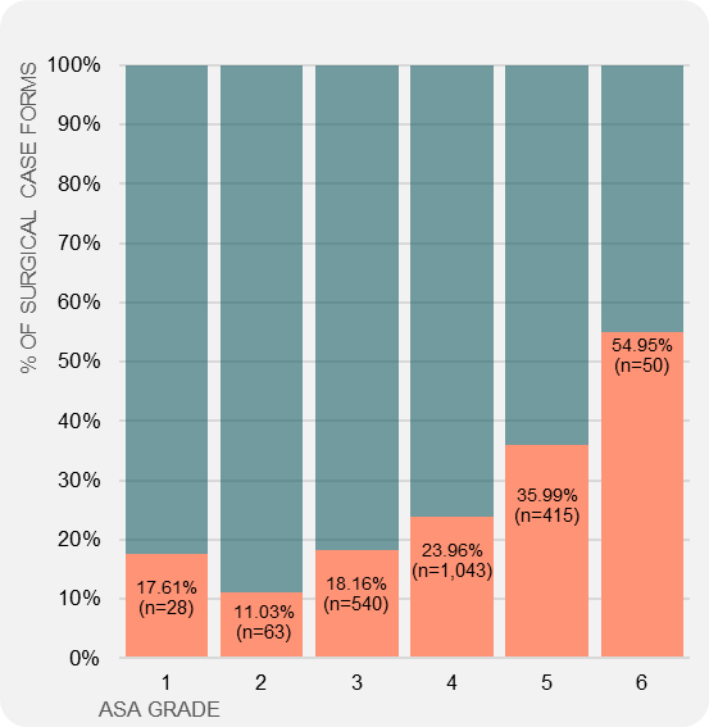


Figure 47: Emergency surgery by ASA grade 2015-2020.

[11] https://www.asahq.org/standards-and-guidelines/asa-physical-status-classification-system

ASA Classification by Specialty

A breakdown of ASA classifications by specialty is provided in Table 10, below, which shows that General Surgery deaths for ASA grades 2 to 5 is consistently ranked highest. However, Neurosurgery is ranked highest for ASA grades 1 and 6.

Surgical specialty	ASA Grade 1	ASA Grade 2	ASA Grade 3	ASA Grade 4	ASA Grade 5	ASA Grade 6	Total Surgical Case Forms
General Surgery	40	267	1,260	1,601	454	23	3,645
Orthopaedic Surgery	8	79	753	818	66	3	1,727
Neurosurgery	81	111	260	499	300	33	1,284
Vascular Surgery	2	19	230	538	114	8	911
Cardiothoracic Surgery	9	26	152	530	167	22	906
Urology	5	41	191	214	27	1	479
Plastic Surgery	7	13	60	71	8		159
Otolaryngology Head and Neck	3	8	44	46	10	1	112
Paediatric Surgery	1		7	19	5		32
Obstetrics & Gynaecology	2	5	12	11	1		31
Ophthalmology	1	2	2	3			8
Oral/Maxillofacial			2	3	1		6
Total	**159**	**571**	**2,973**	**4,353**	**1,153**	**91**	**9,300**

Table 10: ASA grade by specialty for deaths in 2015-2020.

Trend analysis in Table 11 shows the range and average for each ASA grade over the 6-year reporting period (2015-2020).

ASA Grade	Highest	Lowest	Average	Total
ASA Grade 1	37	25	27	159
ASA Grade 2	135	59	95	571
ASA Grade 3	613	360	496	2,973
ASA Grade 4	848	625	726	4,353
ASA Grade 5	218	155	192	1,153
ASA Grade 6	35	2	15	91

Table 11: Range and average for ASA grades (2015-2020).

Co-existing Patient Risk Factors

During the 6-year reporting period, 83.74% (n=8,281) of submitted surgical case forms (n=9,889) indicated there were significant co-existing risk factors (co-morbidities) for the admitted patient, which may increase the likelihood of a fatal outcome post-operatively (Figure 48).

Figure 48: Responses for existing risk factors for deaths in 2015-2020.

The data shows the highest response for existing risk factors was in 2020 (89%), as shown in Figure 49.

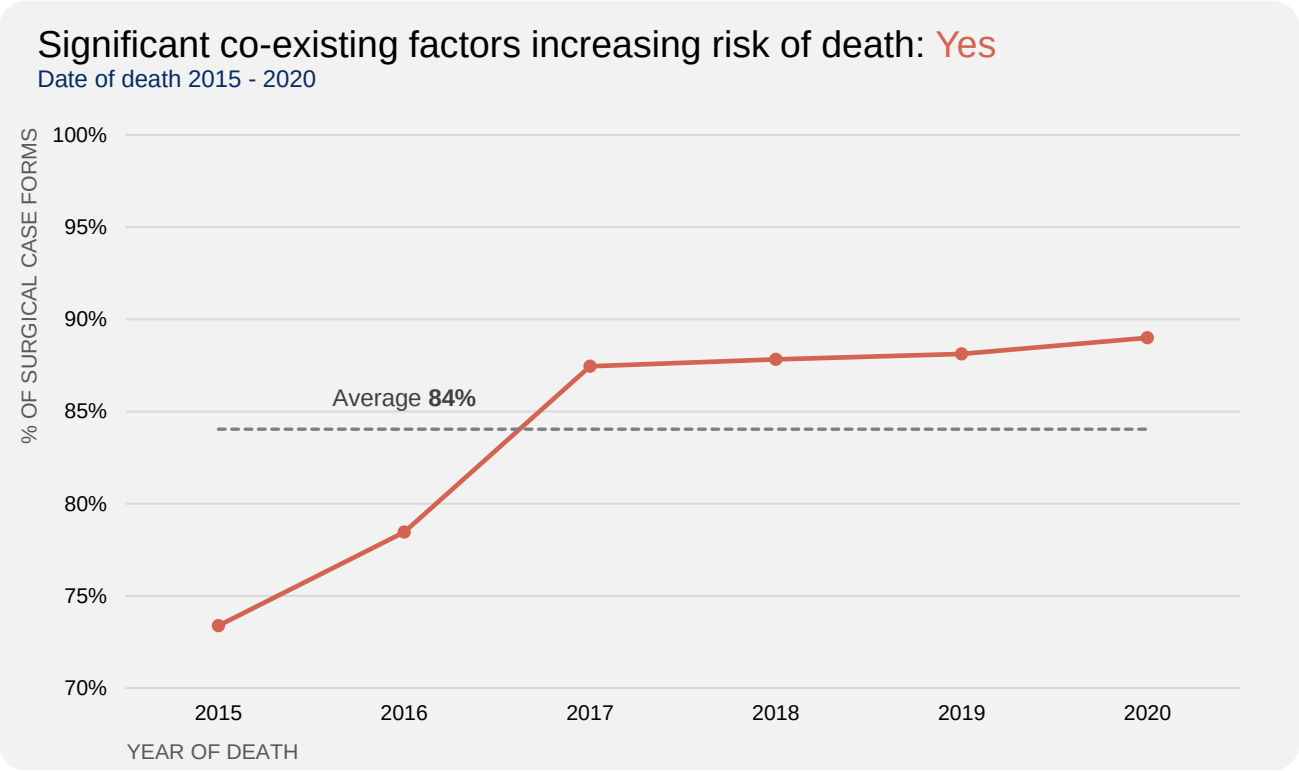


Figure 49: Percentage of existing risk factors by year for deaths in 2015-2020.

For patient deaths where there was no co-existing risk factor, the highest response was in 2019 (12%) which is above the average (10%), with the lowest response in 2017 (8%).

Patient Risk Factors

Figure 50 shows that the highest number of risk factors were for cardiovascular, followed by age and respiratory risk factors. Surgeons are also able to respond with free-text in the 'other' category, which includes such risk factors as: malnutrition, frailty, dementia, diabetes and sepsis.

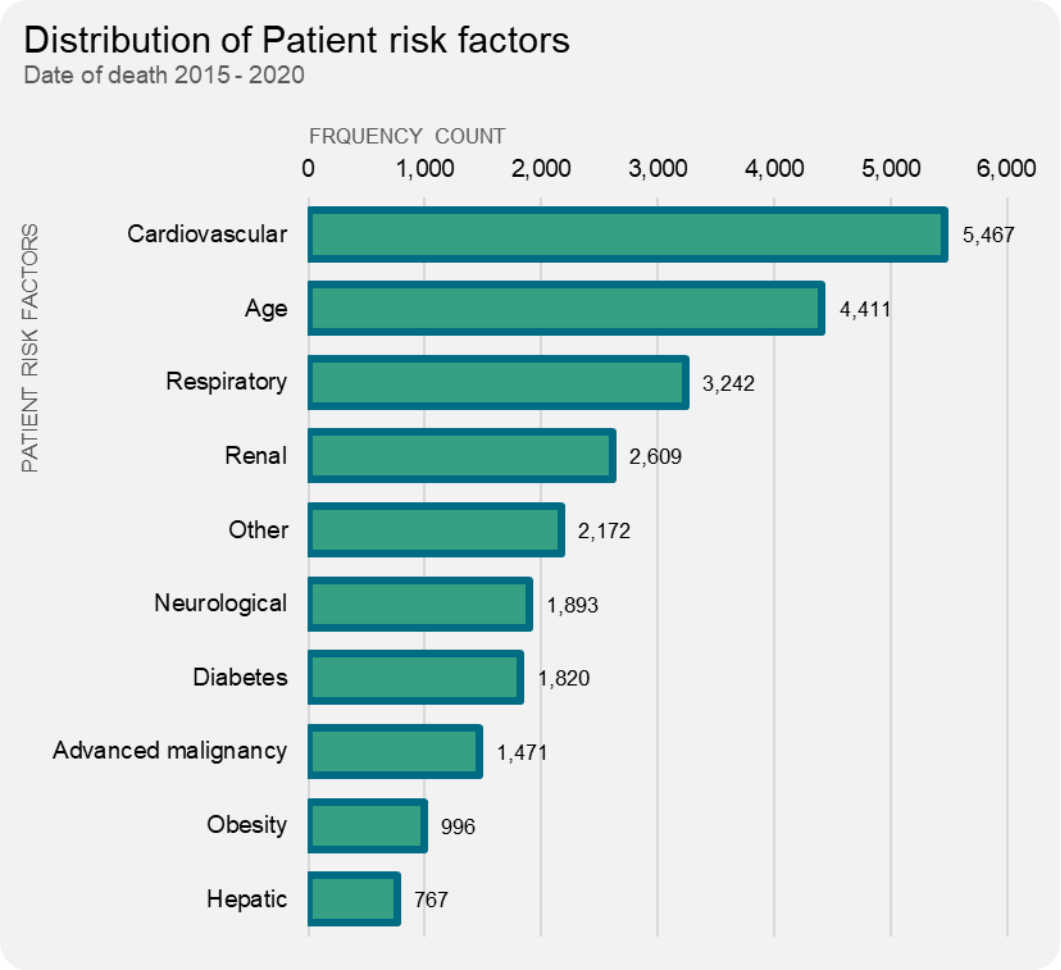


Figure 50: Distribution of existing risk factors for deaths in 2015-2020.

The trend analysis for existing risk factors in Table 12 shows the range and average for each specialty over the 6-year reporting period (2015-2020).

Co-Factor description	Highest	Lowest	Average
Cardiovascular	1,122	801	911
Age	799	645	735
Respiratory	705	402	540
Renal	558	365	435
Other	462	273	362
Neurological	374	241	316
Diabetes	351	252	303
Advanced malignancy	327	159	245
Obesity	196	145	166
Hepatic	149	104	128

Table 12: Range and average for existing risk factors by specialty (2015-2020).

Cause of Death – 2020

A 'final cause of death' is identified in 100% (n=1,345) of surgical case forms submitted for deaths occurring in 2020. Multiple factors/causes of death can be reported due to the complex nature of surgical mortality. Figure 51 shows 50.93% (n=685) of responses by surgeons were reported as a single cause of death.

Figure 51: Cause of death for surgical case forms submitted for deaths in 2020.

Note: This is a comparative analysis by single and multiple factors.

The 'Top 20' causes of death in 2020 accounted for 53.93% of total responses. Figure 52 shows the most frequent as Multiple organ failure (n=211), followed by Septicaemia (n=177) and Respiratory failure (n=130).

A comparison with 2019 deaths shows the 'Top 3' causes of death to be the same causes identified for 2020 - Multiple organ failure (n=240); Septicaemia (n=201) and Respiratory failure (n=140).

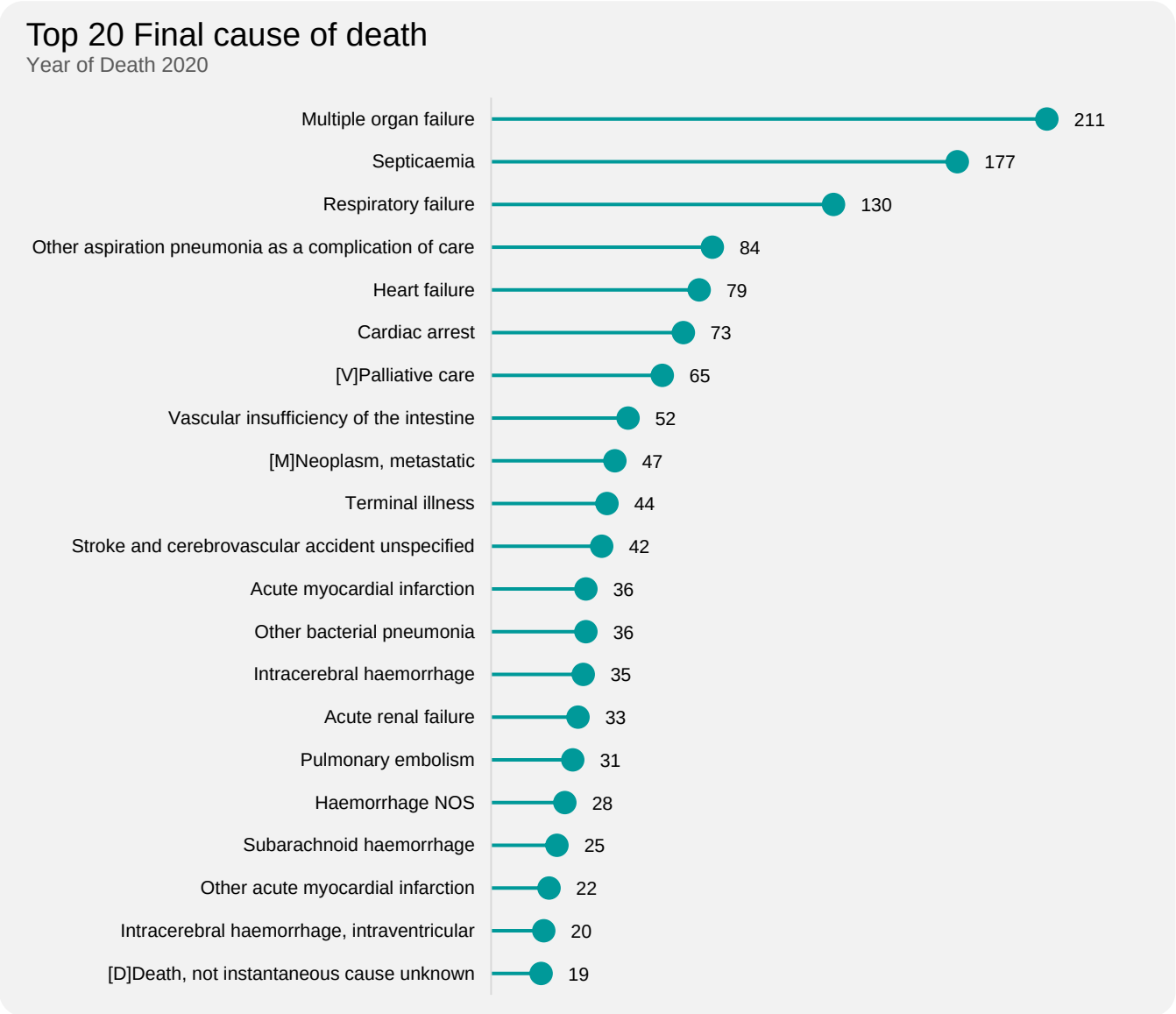
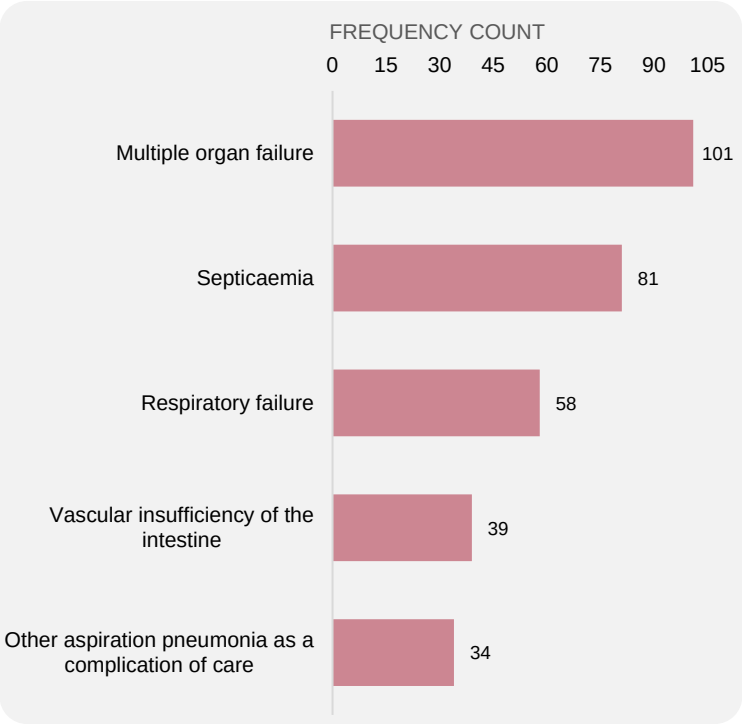


Figure 52: Top 20 *cause of death* responses for deaths in 2020**.**

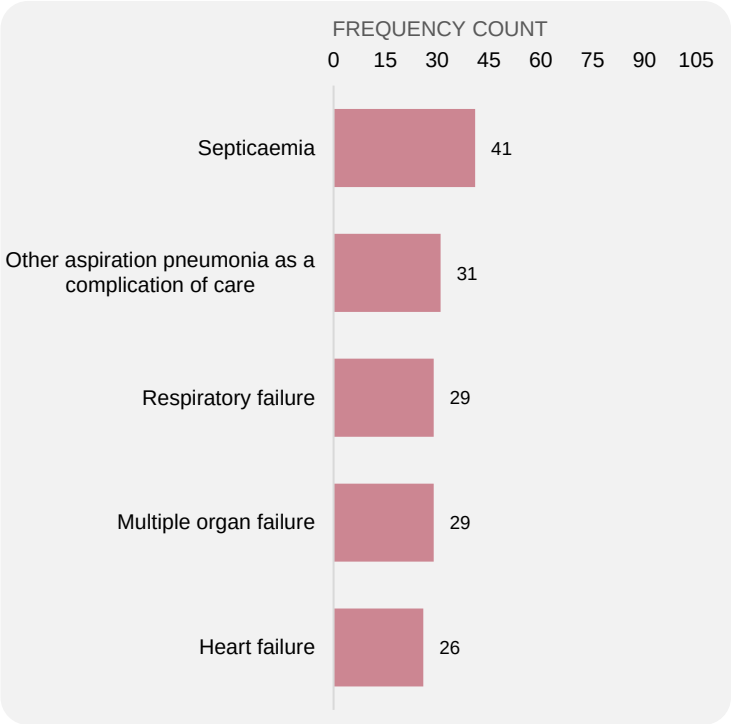
Note: [M] Neoplasm, metastatic and [V] Palliative care are generalised causal codes, which are often used with other codes to explain all aspects of the patient death. E.g., End stage renal disease, where dialysis is no longer an option, may be coded with Palliative care.

The ‘Top 5’ response for *cause of death* in 2020 for 6 specialties with the highest frequency counts is displayed in Figure 53 (on pages 107 and 108). Multiple organ failure (n=150) appears as the highest count in half of the specialties, with septicaemia (n=63) represented in a further 2 of the highest counts.

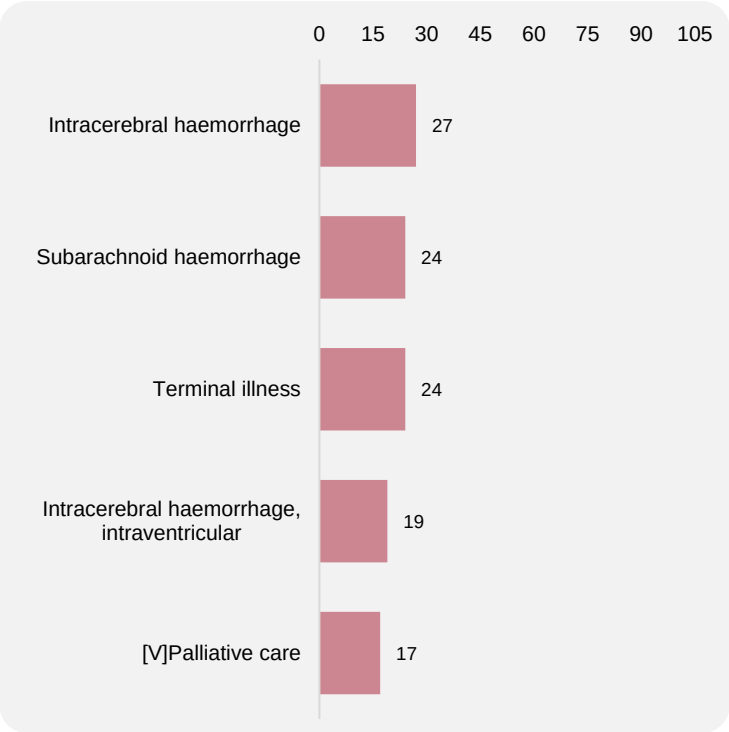
General Surgery



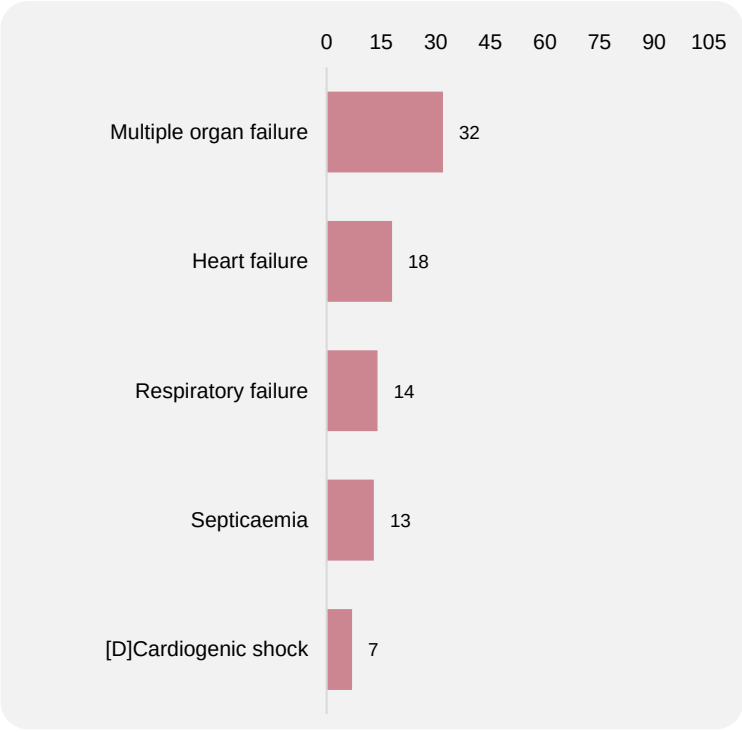
Orthopaedic Surgery



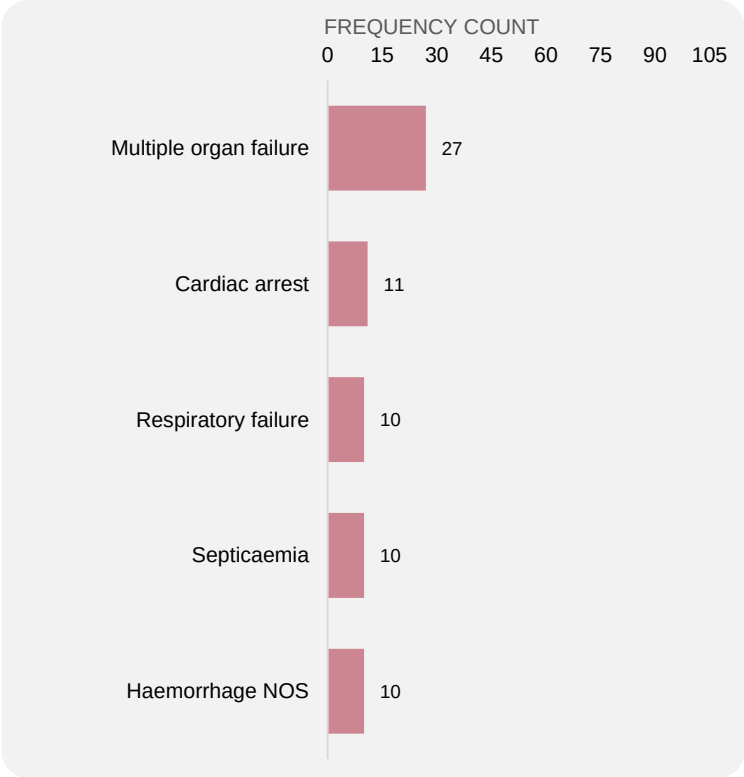
Neurosurgery



Cardiothoracic Surgery



Vascular Surgery



Urology

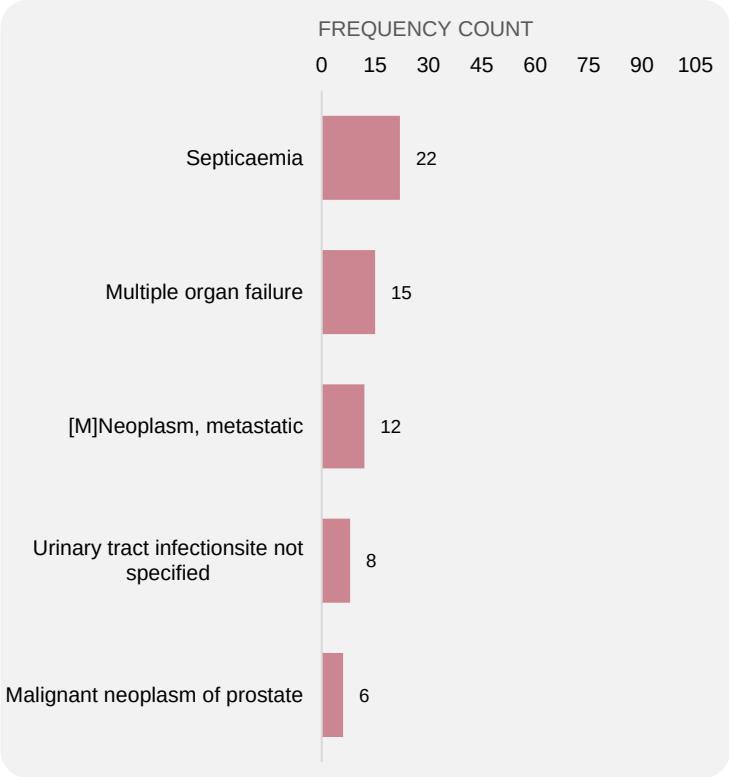


Figure 53: Top 5 *cause of death* for the highest 6 causes in 2020 by specialty.

Note: The remaining specialties are not represented due to the low frequency counts.

Patient Transfers – Trend Data 2015-2020

Figure 54 shows total responses over the 6-year reporting period for inter-hospital patient transfers. There was a high response rate of 98.72% (n=9,762) showing that 22.14% (n=2,187) of patients were transferred, with 10.24% (n=224) experiencing a delay.

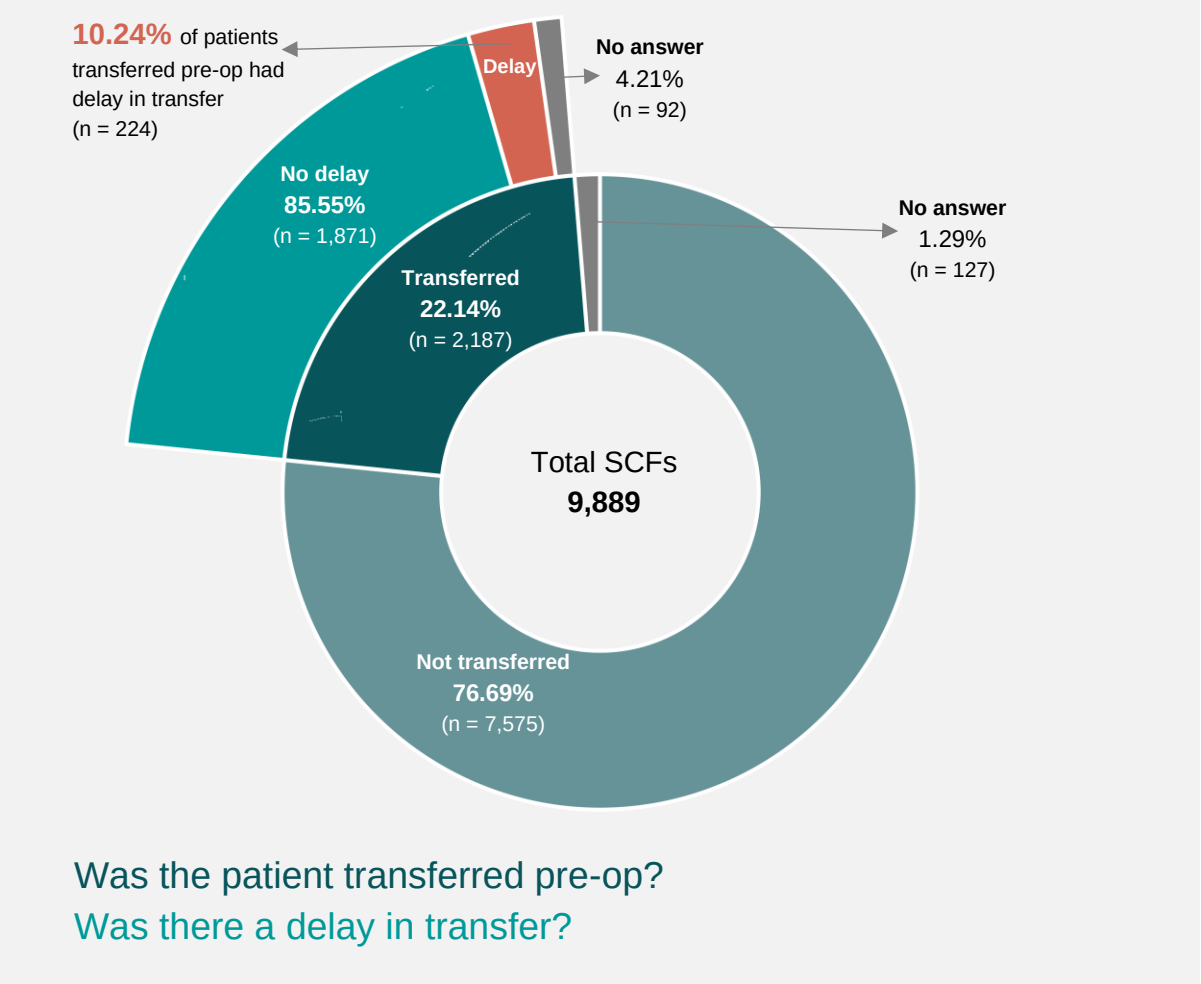


Figure 54: Patient transfer activity and delays for deaths in 2015-2020.

The highest count for inter-hospital patient transfers was in 2017 (n=426) and the lowest in 2020 (n=275), with an average of 365- for the 6-year period. Further, of the 224 cases with a delay in transfer, 2016 had the highest count (n=52) and 2020 the lowest (n=25).

Terminal Care - Trend Data 2015-2020

A total of 2,214 (17.19%) notifications were submitted over the 6-year period confirming the deceased patient was considered as terminal care and the death excluded from the audit. Figure 55 below shows the number of terminal care cases by year, with an average of 369.

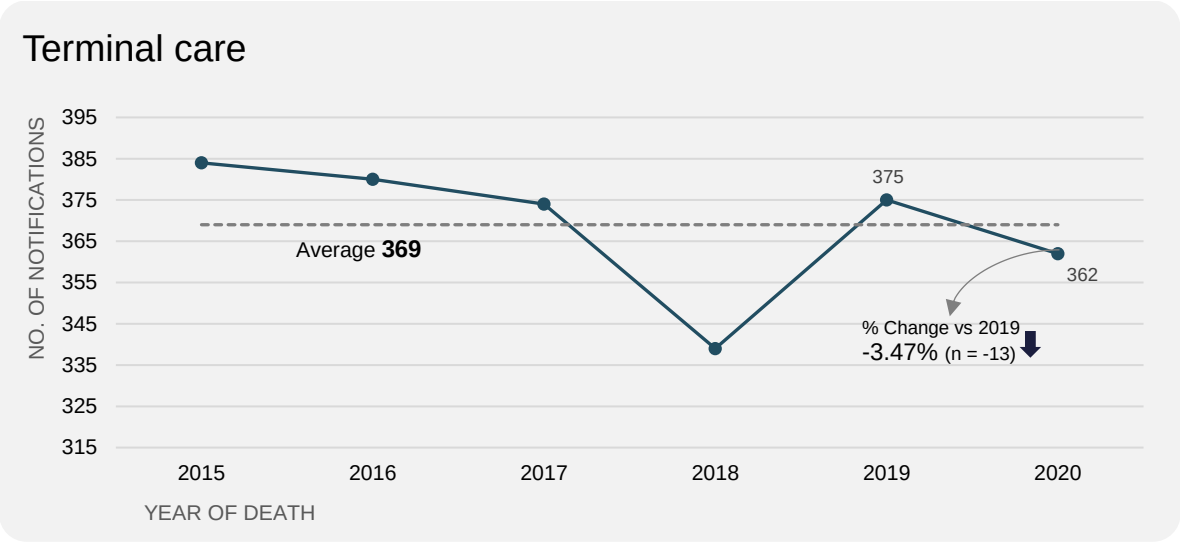


Figure 55: Terminal care deaths in 2015-2020.

Analysis of terminal care cases by specialty over the 6-year reporting period shows the highest responses were for General Surgery (n=1,060) and Neurosurgery (n=627), which equates to 76.20% of all responses, as shown in Figure 56.

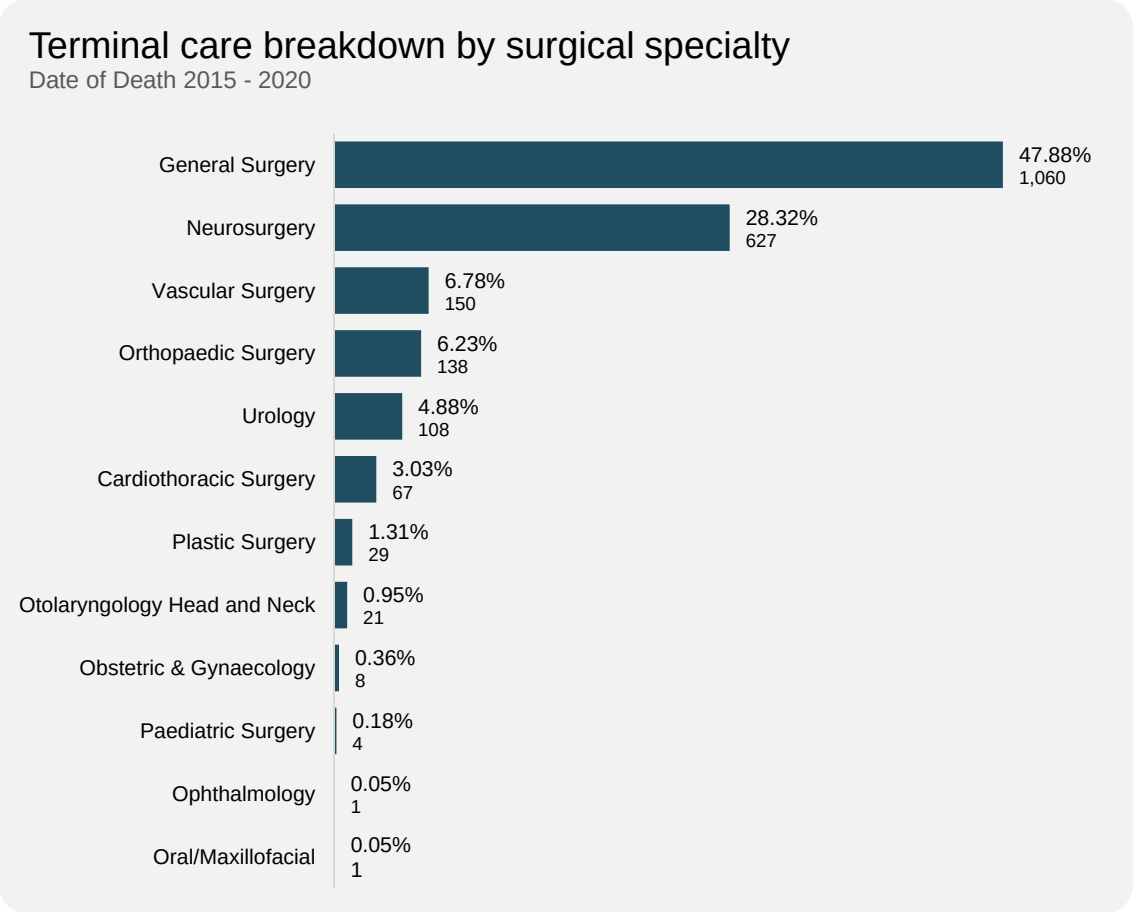


Figure 56: Terminal care deaths by specialty in 2015-2020.

Terminal Care Age Band and Gender

The final chart in this report shows terminal care patients by age and gender (Figure 57). The median age for females was 62.5 years, and 57.5 years for males. The highest representation (16.98%) was in the 85-89 years age band (n=376), although males aged 80-84 years had the same representation (n=180).

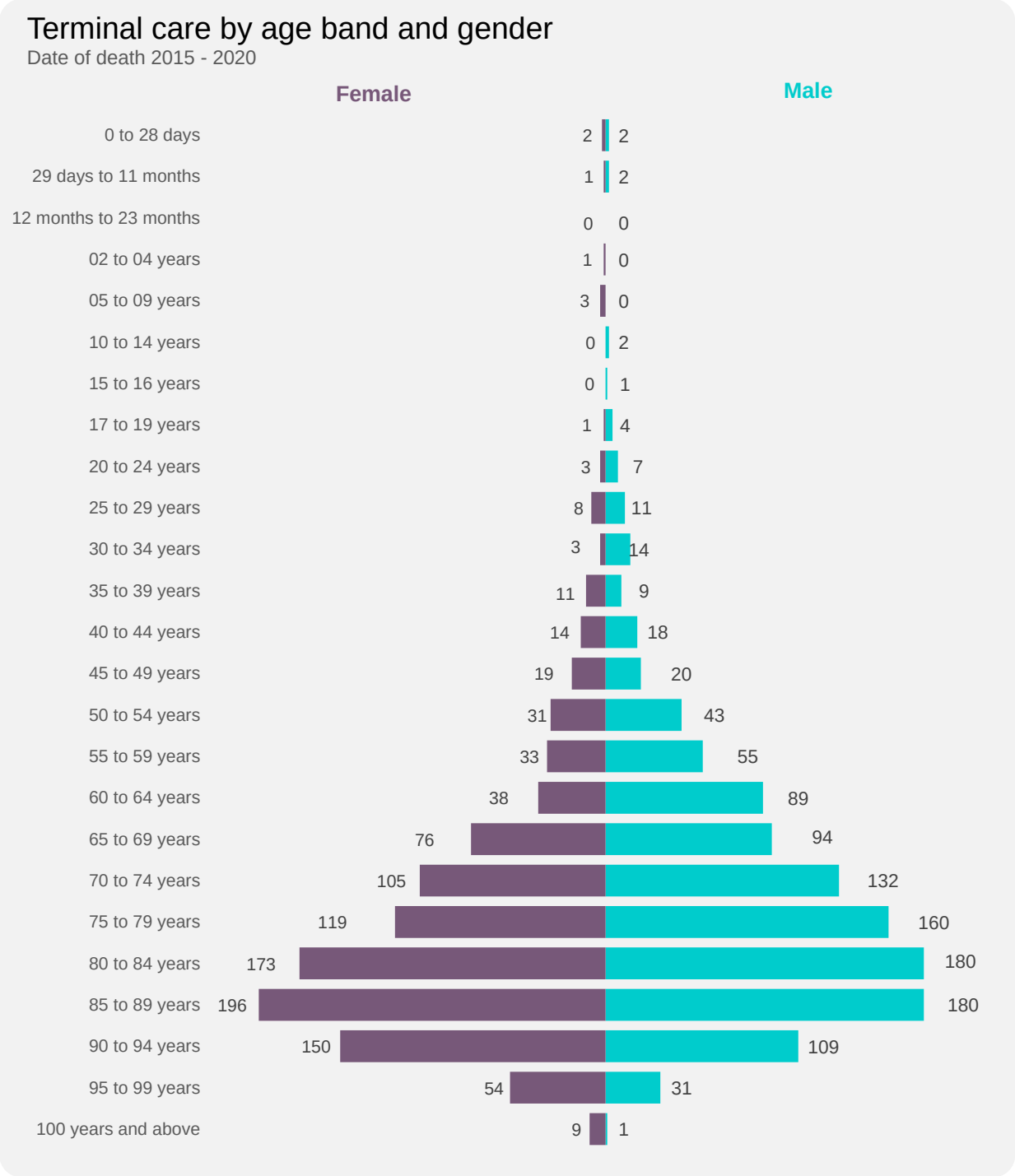


Figure 57: Terminal care responses by age band and gender 2015-2020.

Note: Terminal care patients should not be confused with palliative care patients. Terminal care patients may be admitted with traumatic injuries under a multi-surgeon team or have suffered a brain injury, haemorrhage or stroke and require urgent surgery.

APPENDIX 1

SLA INSTRUCTIONS

CHASM
Collaborating Hospitals Audit of Surgical Mortality

GUIDELINES FOR PEER REVIEW

Completing a Second Line Assessment

Following the outcomes of this research, Second Line Assessors should endeavour to review these key areas in their independent case note assessment:

- Appropriate and timely diagnostic and therapeutic measures
- Correct indication and timing of
  - Operations
  - Interventions
  - Intensive care
  - Resuscitation orders
  - Palliative care treatment orders
- Consideration and adherence to guidelines
- Monitoring of the treatment process
- Effective interdisciplinary co-operation
- Accurate documentation of patient management and patient records
- Correct assessment of working diagnosis and treatment effects

Research Outcomes: Peer Review

The goal of peer review is to add to your learning. It aims to identify challenges in clinical management so as to improve future treatments.[1,3]

Some of the challenges which may improvement treatment quality include:[2]

- Inadequate interdisciplinary co-operation
- Delayed transfer from ward to the intensive care unit
- Misdiagnosis of complications

Other areas of consideration for peer review, such as organisational shortcomings which affect surgical outcomes, may include:[1]

- Unclear responsibilities in emergency cases
- Structural / Infrastructure issues that impede access, transfers and diagnostics, which may lead to delays in treatment/ care

The results of three studies conducted on peer review on the effect of hospital mortality rates suggest that:[1][2](3)
The combination of outcome measures with peer review can identify treatment processes that are deficient, and; implementing improvement protocols can help to lower mortality rates.

Further, detecting adverse events through retrospective patient record reviews is more effective than voluntary reporting systems.[1]

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1. U. Nimptsch, T. Mansky, Quality Measurement combined with Peer Review improved German in-hospital mortality rates for four diseases; Health Affairs 32, No. 9 (2013): 1616-1623. DOI:10.1377/hithaff.2012.0925 September 2013 32:9 https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2012.0925 Accessed 17 April 2019
2. W. Krahwinkel, E. Schuler, M. Liebetrau, A. Meier-Hellmann, J. Zacher, R. Kuhlen, For the HELIOS Medical Board and HELIOS Working Group on Peer Reviewing, The effect of peer review on mortality rates, International Journal for Quality in Health Care, Volume 28, Issue 5, 10 October 2016, Pages 594–600. DOI: 10.1093/intqhc/mzw072 https://academic.oup.com/intqhc/article/28/5/594/2499471 Accessed 17 April 2019
3. Chi-Wai Lui, Frances M. Boyle, Arkadiusz Peter Wysocki, Peter Baker, Alisha D'Souza, Sonya Faint, Therese Rey-Conde, John B. North. How participation in surgical mortality audit impacts surgical practice. BMC Surgery. 2017;17:42 DOI:10.1186/s12893-017-0240z: https://bmcsurg.biomedcentral.com/articles/10.1186/s12893-017-0240-z

Example report - Renal insufficiency in a patient with a severely ischaemic right foot

Background

This 83 year old man was admitted to hospital for further treatment of a severely ischaemic right foot. He had a nine month history of rest pain in the foot and had also developed septic arthritis in the right fourth toe some time before admission. He was an overweight man with a past history of diabetes and polymyalgia for which he was on steroids.

Sequence of Events

His admission blood sugars were of the order of 15.0 mmol/L and there was mild renal insufficiency with a CGFR of 45 mL/min and a creatinine of 0.18 mmol/L.

Initially angioplasty the day following admission was cancelled, as the patient was not adequately hydrated. On the second day after admission, he proceeded to angioplasty, though unfortunately the procedure was complicated by a tibio-peroneal artery dissection. Further anterior tibial subintimal angioplasty was attempted and a dorsalis pedis pulse was recorded at the end of the procedure though it faded quickly. The patient was then managed conservatively but on the second day post angioplasty developed diarrhoea, worsening renal function and became septic. There had been a suggestion of a UTI on admission.

Three days post angioplasty it was decided that the patient's leg required amputation and he underwent a below-knee amputation. According to the anaesthetic notes however, the patient was 'in extremis' on presentation to theatre. He managed to survive the procedure and was subsequently managed in ICU for a few days. He then went back to the ward where his condition deteriorated and he died fairly quickly from renal failure, cardiac insufficiency and sepsis.

Areas of Good Practice / Deficiencies of Care (if any)

While it is difficult to tell from the notes the critical nature of the limb and whether in fact muscle ischaemia was severe, I think it is unlikely, given this elderly man's co-morbidities as mentioned above, that an angioplasty alone would have salvaged his leg. Given the fact that he had pre-angioplasty mild renal insufficiency, one would have been more tempted to offer him primary toe or below-knee amputation as a first-line measure of treatment so as to get rid of one of the septic foci. The UTI may well have contributed to his ultimate demise with systemic sepsis.

Also from the notes it appears that despite a second angioplasty procedure achieving some benefit angiographically, the patient was still in severe foot pain and required morphine for this. In view of this, it became quite clear that revascularization was not going to be helpful and therefore I would have recommended earlier below-knee amputation.

Summary

The main issues arising from my assessment of this case are related to:

1. Proper hydration prior to any angioplasty procedure in a patient with renal insufficiency
2. When the angioplasty failed, further earlier amputation in all probability would have been beneficial.

Learning Points

I think this case highlights the importance of hydration before any radiology procedure involving contrast, especially in patients with pre-existing renal insufficiency. There did not appear to be communication between the vascular staff and the radiologists (who did the angioplasty) concerning this problem. Hence the radiologist quite rightly cancelled the first procedure until such time as hydration had been improved.

CHASM would like to extend its gratitude to the Queensland chapter of the Australian and New Zealand Audit of Surgical Mortality for sharing this case study as an example for Second Line Assessors in New South Wales.

APPENDIX 2

SELF-REPORTING A SURGICAL DEATH TO CHASM

When a surgeon becomes aware of the death of their patient, they can self-generate a *notification of death* using fellows interface. After logging-on, select the “self notify” tab on the far left of the page (Image 1), this will automatically create a new case and go to the “notification of death” screen (Image 2).

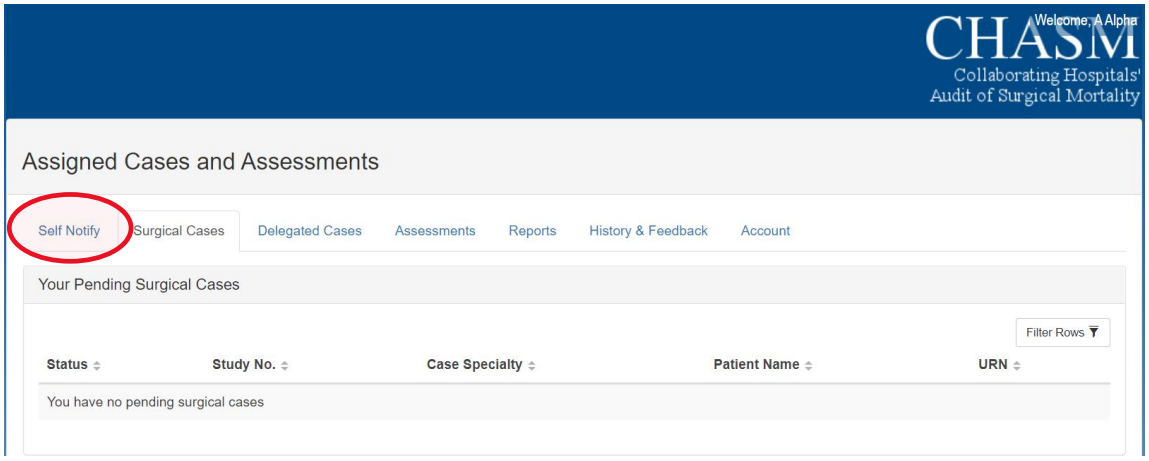

Image 2: Self Notify tab.

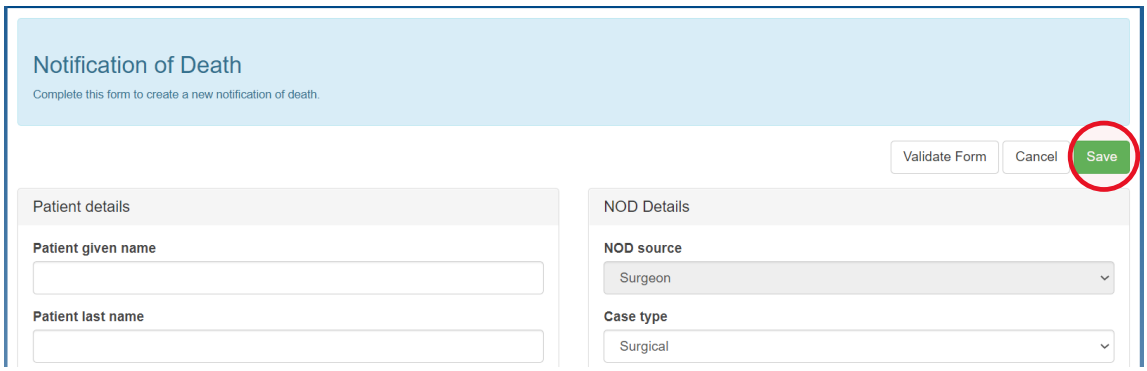

Image 3: Notification of Death screen.

Complete the patient details and click the “save” button at the top-right of the page.

The following pop-up message (Image 3) should appear after the “save” button is clicked.

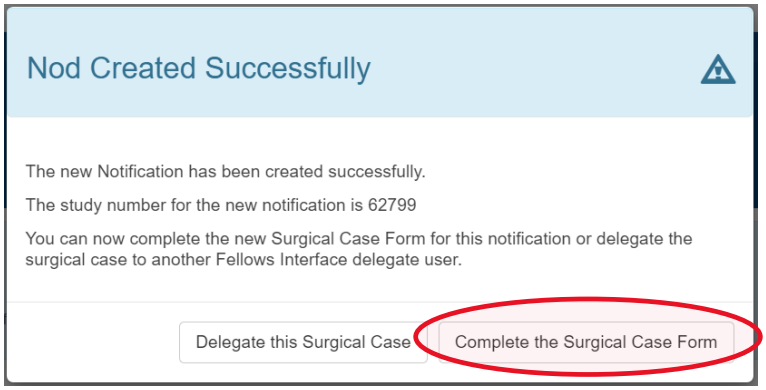

Image 4: Notification of Death created successfully pop-up box.

Click on the “complete surgical case form” button (Image 3) and the screen below will appear. Work through all sections on the Surgical Case Form (SCF) and click the “submit” button on the right-hand side of the form (Image 4).

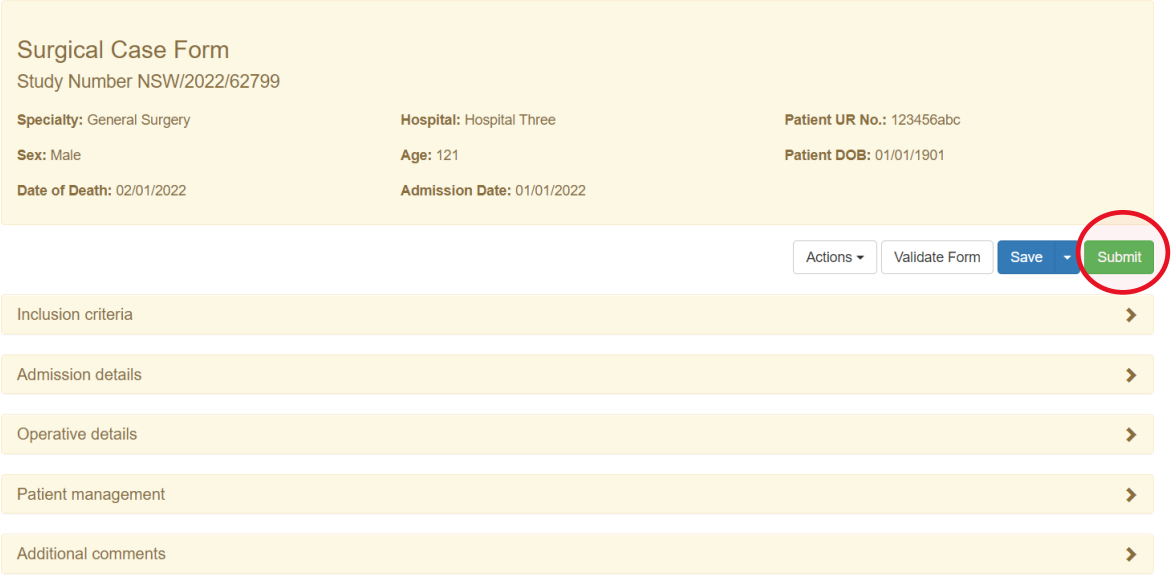

Image 5: Surgical Case Form screen.

When the “submit” button is clicked, the following message should appear (Image 5) on the bottom of the screen.

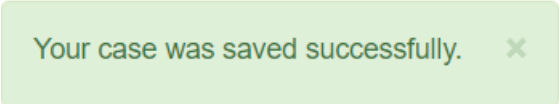

Image 6: Pop-up confirmation message.

However, if a question has not been completed, the “submit” button (Image 6) will not be able to be clicked.

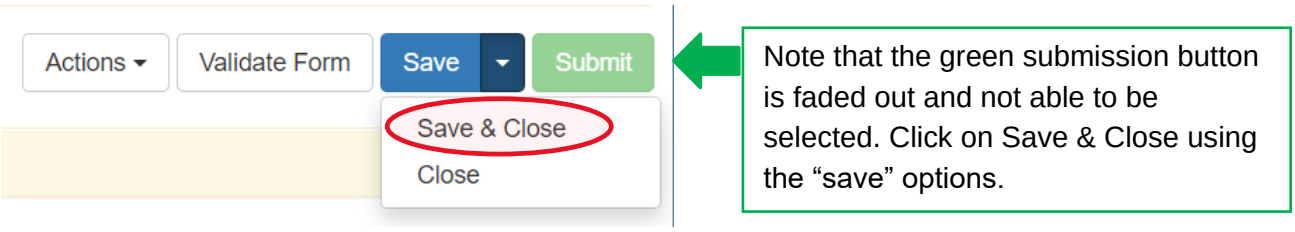

Image 7: “Save” drop-down menu for options.

Click “Save & Close” and go back to the main menu on the “surgical cases” tab. Click on “Surgical Case Pending” (Image 7) to re-open the case.

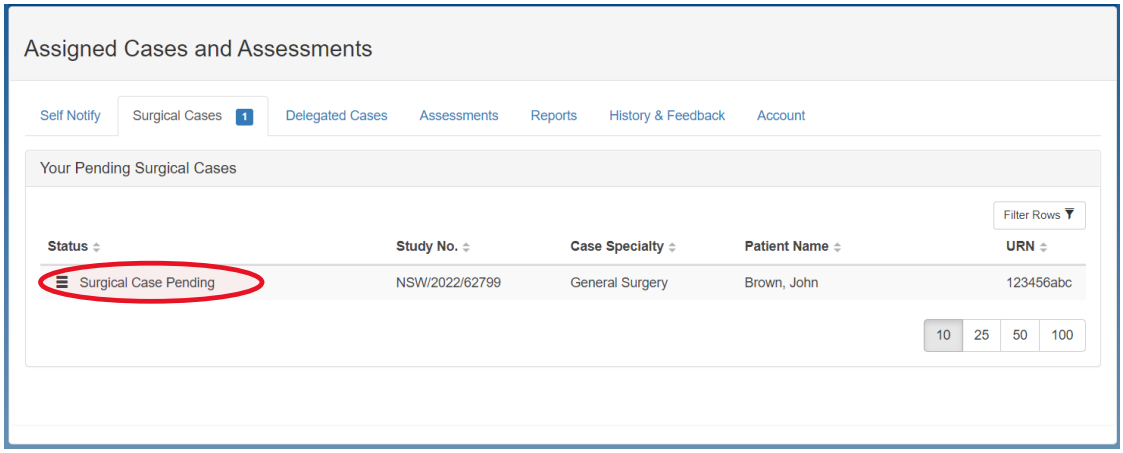

Image 8: Main menu – Your Pending Surgical Cases.

The case form should open with a selection of buttons appearing on the right-hand side. Click on “Validate Form” (Image 8) to identify the questions that have not been answered.

Image 9: Pending Surgical Case Form option buttons – validate form.

A pop-up box containing a list of unanswered questions will appear, each question will have a response icon (Image 10) which will go back to the unanswered question.

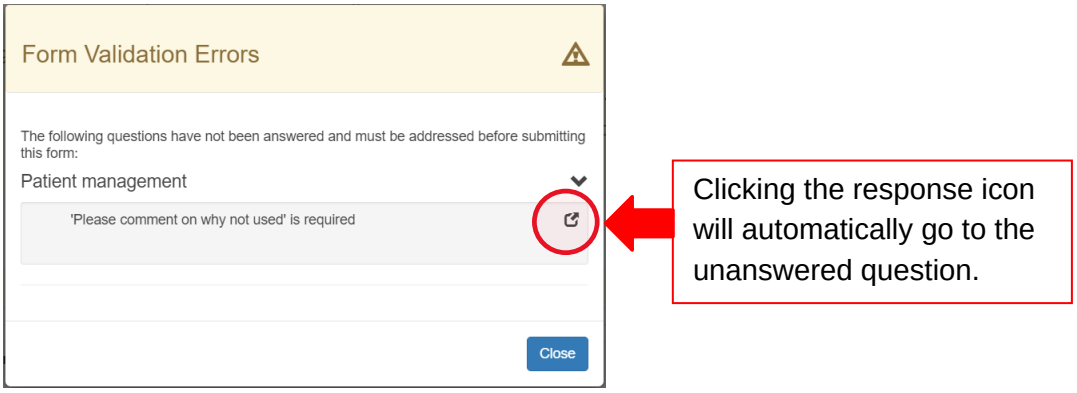

Image 10: Response icon on the Form Validation Errors pop-up box.

When all the unanswered questions listed in the pop-up box are completed, click on the “submit” button (Image 11).

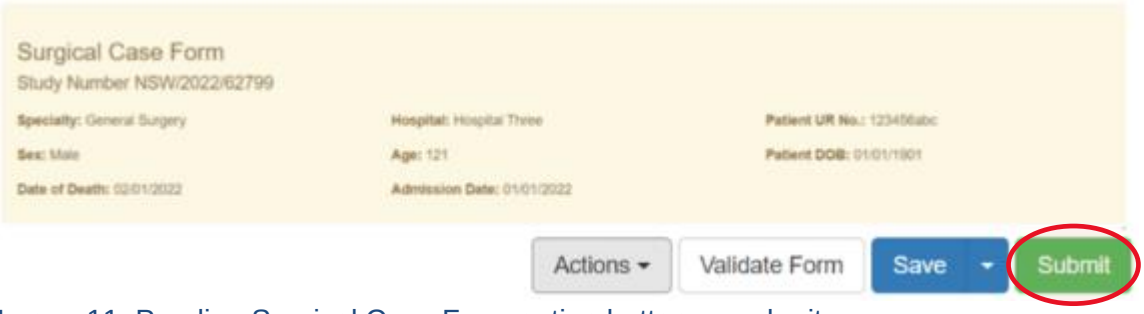

Image 11: Pending Surgical Case Form option buttons – submit.

If “Save” is clicked instead of “Submit” (Image 11), a validation process will be required by clicking the green “Ready” button (Image 12).

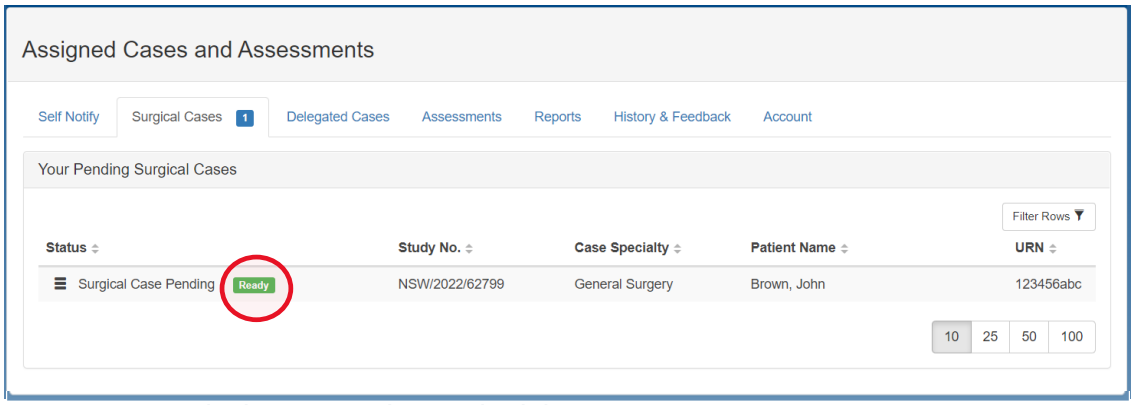

Image 12: Surgical Case ready to submit button.

Click the “Validate Form” button (Image 11) and a pop-up box should appear (Image 13) to confirm the successful validation. Click “Ok” to finalise.

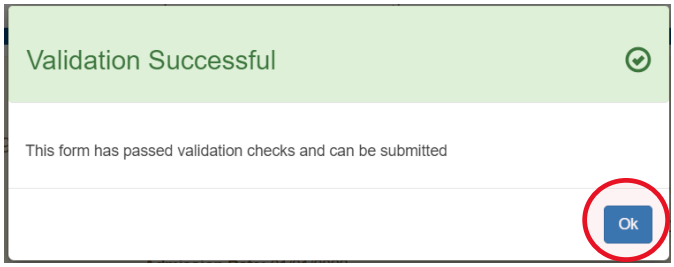

Image 13: Validation Successful pop-up box.

Upon return to the main menu (Image 14), the status should read: “You have no pending surgical cases”. To locate submitted cases, click on the “History and Feedback” tab.

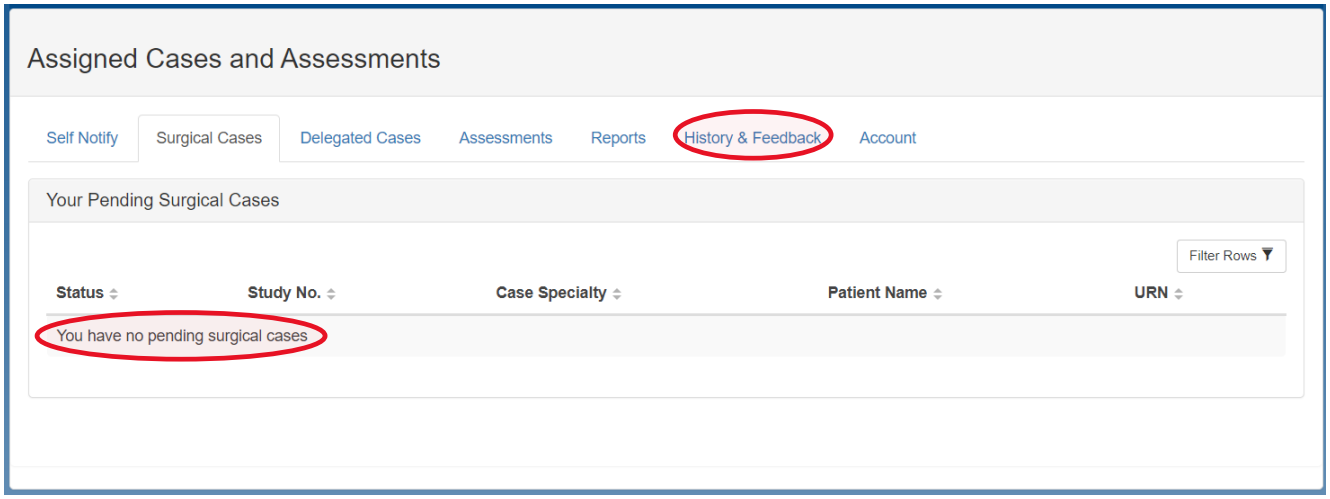

Image 14: Assigned Cases and Assessments – **You have no pending surgical cases**.

APPENDIX 3

Tables

Figures