



ROYAL AUSTRALASIAN  
COLLEGE OF SURGEONS

**QASM**

Queensland Audit of Surgical Mortality



Northern Territory Audit  
of Surgical Mortality

# LESSONS from the AUDIT

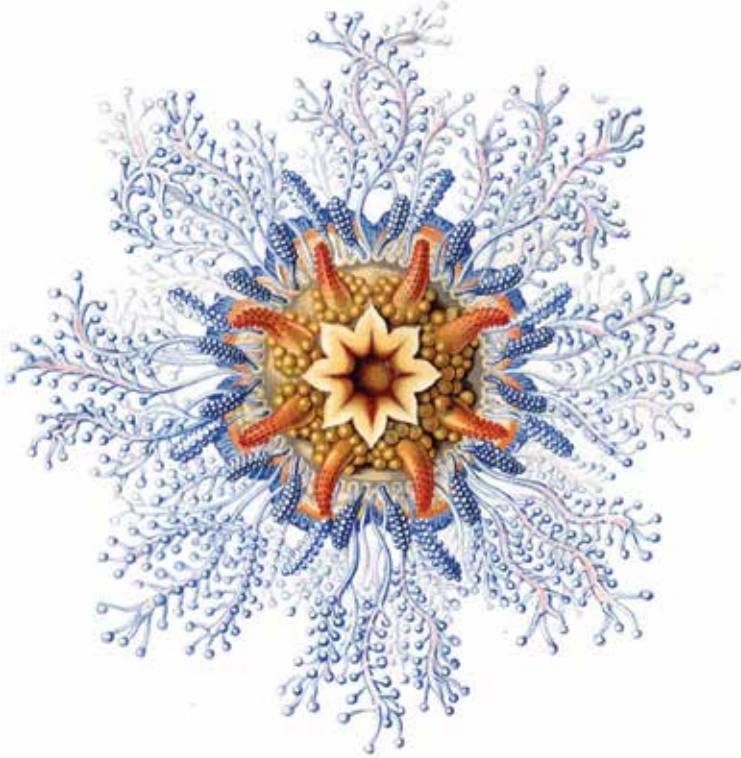
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## Introduction

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The in-focus theme for *Lessons from the Audit* (Volume 13) is ‘Surgery and the obese patient’.

**The main message from these lessons is that the obese patient is a “fragile” patient when operated on or when suffering a significant physiological insult.**

The six QASM case studies presented are all non-bariatric surgical patients.

The prevalence of obesity, as a comorbidity, in the QASM population data is 9.1%.

According to Queensland Department of Health guidelines (SWAPNET)<sup>1</sup>, patients with BMIs<sup>2</sup> greater than 30 are increasingly presenting to Queensland hospitals for surgery and these patients pose an increased burden on the health system because they require additional preoperative and postoperative care.

The case studies provided here (all with BMIs greater than 30) attempt to highlight the complexities of managing the obese surgical patient. I have included resulting lessons and recommendations for each case study. I welcome your feedback on these lessons and recommendations.

It is important that obesity, it itself, should not determine decisions or management. The significance of all comorbidities must be considered. The fragility of obese patients increases with the duration of their obesity (and increases with BMI).

Our College needs to urgently address the problem of the obese patient and their surgical management. This volume only brings to light a few cases from our overall surgical mortality database of obese patients. It would be appropriate that we as a College produce guidelines that support and reinforce the standards set by our anaesthetic colleagues in their approaches to this ever increasing problem area.

I would like to acknowledge Dr Andrew Jamieson’s valuable insight and comment when reviewing these lessons. Dr Jamieson is the Past President of the International Federation for Surgery of Obesity and the Past President of the Obesity Surgery Society of Australia and New Zealand.

Yours sincerely

John North  
QASM Clinical Director

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1 Statewide Anaesthesia and Perioperative Care Clinical Network (SWAPNET): “Anaesthesia: Non-bariatric Surgery in Obese Patients” (<http://www.health.qld.gov.au/qhpolicy/docs/gdl/qh-gdl-395.pdf>)

2 Body Mass Index (BMI) is according to World Health Organisation classifications. (<http://www.who.int/mediacentre/factsheets/fs311/en/>)



## Shortened forms

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<b>BMI</b>	body mass index (weight in kilograms/height in metres squared) ( <a href="http://www.who.int/mediacentre/factsheets/fs311/en/">http://www.who.int/mediacentre/factsheets/fs311/en/</a> )
<b>CCU</b>	coronary care unit
<b>CO<sub>2</sub></b>	carbon dioxide
<b>CPR</b>	cardiopulmonary resuscitation
<b>CT</b>	computed tomography
<b>DVT</b>	deep vein thrombosis
<b>ECG</b>	electrocardiogram
<b>HDU</b>	high dependency unit
<b>ICC</b>	intercostal catheter
<b>INR</b>	International Normalised Ratio
<b>IV</b>	intravenous
<b>MET</b>	medical emergency team
<b>non-STEMI</b>	non-ST elevation myocardial infarction
<b>QASM</b>	Queensland Audit of Surgical Mortality
<b>SVT</b>	supraventricular tachycardia
<b>SWAPNET</b>	Statewide Anaesthesia and Perioperative Care Clinical Network
<b>TEDS</b>	thrombo-embolic disease stockings
<b>VAC</b>	vaccum-assisted closure



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## Case study (1) (Plastics)

### *Necrotising fasciitis: always an urgent problem!*

The QASM assessor specifically stated “this case does highlight the difficulties of surgical management of complex patients in medical wards. The diagnosis of major concern in both hospitals was the presence of an abdominal wound needing urgent surgical review. The time taken for that review was an issue. Necrotising fasciitis is a critical condition where emergency surgery is indicated.”

A summary of the case follows.

### The patient:

- was middle aged
- was obese (Body Mass Index (BMI) >30) (140 kilograms)
- had hyperparathyroidism, Stage V chronic renal disease (predialysis), insulin-dependent diabetes, hypertension, and Factor V Leiden (needing warfarin anticoagulation)
- had soft tissue disease including sacral pressure area, ulceration, and Charcot’s arthropathy of the left foot
- had had a previous amputation, for infection, of toes on right foot

### What happened at regional hospital?

- The patient’s initial presentation was for ongoing nausea and pain from abdominal wall ulceration.
- The aetiological cause of the ulcer was considered to be tertiary hyperparathyroidism (including calciphylaxis which is seen ‘almost exclusively in end-stage V chronic renal disease. It is a serious

disease resulting in refractory chronic non-healing wounds and it is often fatal!’)

- The patient underwent a full review and optimisation by renal, endocrine, cardiac, gastro-enterological, vascular, and dermatological medical specialities.
- The patient’s wounds were then reviewed by orthopaedic and plastic surgical departments.
- The patient underwent parathyroidectomy to control the tertiary hyperparathyroidism (and thereby better controlled abdominal ulceration).
- The patient’s nausea continued postoperatively.
- Conservative wound care was indicated for the abdominal ulceration, according to plastic surgical opinion.
- Surgical debridement offered the moderate risk of further wound deterioration. Wound sepsis was considered to be the indication for surgery.
- The patient was discharged from the regional hospital.
- Four days later, the patient was admitted to the tertiary referral hospital for wound follow up (via the plastic surgery outpatients). At this time, significant social and medical specialty follow ups were also arranged.

### What happened at the tertiary referral hospital?

- The patient presented with abdominal wall sepsis and enlarging ulceration, and was immediately started on intravenous antibiotics.



- Urgent surgical consultation was requested by the emergency ward and subsequent medical ward, but the patient was not reviewed by the surgical team for four days.
- Examination revealed extensive necrosis, cellulitis and discharge consistent with a diagnosis of necrotising fasciitis.
- Emergency same-day surgical debridement of the wound was performed and, postoperatively, the patient stayed overnight in the Intensive Care Unit (ICU).
- Further surgery was not indicated despite, postoperatively, minor deterioration of wound edges.
- Five days postoperatively, the wound dressings were converted to vacuum-assisted dressings (VAC).
- Hyperbaric oxygen therapy was arranged but did not occur due to lack of hospital beds.
- The patient continued to deteriorate (complicated by pain, confusion and poor oral intake).
- Three weeks postoperation, a palliative management plan was instituted after discussion with family and involved medical teams.
- Aggressive therapy ceased and end-of-life care started. The patient died three days later.

### **What issues are highlighted by this case?**

- The difficulty of managing complex obese patients in medical wards.
- The presence of an abdominal wound needing urgent surgical review, and the need

for teamwork between medical and surgical teams (when consultation is requested).

- Necrotising fasciitis is a critical condition where emergency surgery is indicated. Delay will often mean death.
- The burden to the community due to obesity contributes substantially to health care costs with poor outcomes on many occasions. The complexity of this scenario was due in major part to the BMI status of the patient.

### **QASM recommendations:**

- Obese patients with abdominal wound sepsis require urgent consultant-led care within reasonable timeframes.
- Inter-hospital transfer of obese patients needs prospective planning to avoid delays.
- Medical wards must be set up to correctly and safely manage surgical patients with high BMIs. Indicated equipment must include appropriate wheelchairs, lifting equipment, and beds. For complex investigations, scanners must also be able to accept the obese patient.
- Surgeons and other specialists need training in the management and handover, preoperatively and postoperatively, of obese surgical patients.





## Case study (2) (Orthopaedic)

### *Obesity and arthroplasty: a dangerous mix?*

The QASM assessor specifically stated there were concerns “with the left pleural effusion which may have been undertreated and possibly contributed to the patient’s ongoing confusion and subsequent demise”. The assessor also commented that “the main underlying factor in this case was poor patient selection for the proposed elective procedure”.

A summary of the case follows.

#### **The patient:**

- was elderly
- was obese (BMI>30) (170 kilograms)
- had significant comorbidities (ischaemic heart disease, cardiomyopathy, atrial fibrillation, obstructive sleep apnoea, smoking, alcoholism)

#### **What happened at the tertiary referral hospital?**

- The patient was admitted for an elective left total hip replacement. The patient was pre-morbid and had preoperative compliance issues.
- On admission, the patient’s International Normalised Ratio (INR) was 2.1 because they had not ceased their warfarin as planned. This required the use of prothrombin X and vitamin K.
- Preoperative assessment and planning took place with the cardiology team and the anaesthetic team.

- Surgery was uncomplicated (a surgical trainee operated with consultant surgeon scrubbed; operation time was acceptable.)
- Postoperation, the patient was confused and non-compliant. “Postoperative management was appropriate considering the circumstances that confronted the surgical and medical teams – that is; patient confusion and Medical Emergency Team (MET) calls.”
- Day 5 postoperation, the patient had non-ST elevation myocardial infarction (STEMI) (cardiologist care with heparin infusion). The patient was successfully resuscitated but required an intercostal catheter for a traumatic left pneumothorax. (The intercostal catheter (ICC) was removed on day 19 postoperation.)
- Day 12 postoperation, the patient had a cardiac arrest on the ward and was admitted to ICU. Two days later the patient was discharged back to the ward.
- Day 19 postoperation, the patient suffered a cardiac arrest on the ward. Cardiopulmonary resuscitation was not successful.

#### **What issues are highlighted by this case?**

- Appropriate patient selection for elective procedures is important. For example, the selection of a total hip replacement for a non-compliant patient with multiple comorbidities, including morbid obesity, is poor patient selection.





- When multiple teams are involved in the decision making and planning, it is important to ask who takes responsibility (or final ownership) for the patient.
- Some questions remain unanswered. For example: was the “left pleural effusion which may have been left undertreated and possibly contributed to the patient’s on-going confusion and subsequent demise” really considered and treated in a rational way?

### **QASM recommendations:**

- Major surgery must not be offered when the patient’s condition is non-life threatening but the patient’s comorbidities are life threatening.
- Elective joint replacement must be carefully considered in the presence of unchangeable and complex comorbidities that are likely to be co-contributors to mortality.
- Surgeons must always rationally consider potential risks against potential benefits especially when consenting the elective patient. The risks and benefits must be discussed frankly with patients and their families. The decisions arising from those discussions must be documented on consent forms and clinical records.
- Surgical trainees must have written consultant approval to place all elective cases (for major surgery) on a waiting list.
- National guidelines are clear: patients must not be placed on a waiting list unless they are ready to begin the process leading directly to surgery.





## Case study (3) (Orthopaedic)

*Obesity, trauma and DVT prophylaxis: it is never easy!*

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The QASM assessor specifically stated that the timing and type of DVT prophylaxis could be questioned for this case. The DVT prophylaxis “was instituted 4 days after admission”. The assessor also stated that “the timing of chemical prophylaxis in trauma is difficult, particularly with open wounds, but it (DVT prophylaxis) could have been instituted at an earlier stage. Heparin 5000 units bd was used.”

Autopsy examination stated that “there was severe coronary artery disease in the left main coronary artery and the left anterior descending coronary artery as well as the right coronary artery. Thrombus was blocking the anterior descending coronary artery.” The pathologist could identify that the thrombus had only recently formed.

A summary of the case follows.

### The patient:

- was middle aged
- was obese (BMI>30) (130 kilograms)
- had a surgical history of gastric banding surgery
- had a medical history of hypertension and obstructive sleep apnoea
- was medicated with ramipril
- was known to be allergic to penicillin (rash)
- smoked 20 cigarettes per day

## What happened at the tertiary referral hospital?

- The patient was admitted after an accident (injuries included a complex compound hand injury and a compound knee injury).
- The patient was taken to surgery and the injuries were managed appropriately by a registrar.
- Day 4 postoperation, the patient returned to theatre for further management of injuries and wound closure.
- Surgeries and anaesthetics proceeded uneventfully.
- Day one after the second operation, the patient was mobilised.
- The patient’s deep vein thrombosis (DVT) prophylaxis included Thromboembolism-Deterrent Stockings (TEDS) and 5000 units heparin bd (this was started four days post-admission).
- Seven days after admission, the patient had a ‘funny turn’ for ‘a few minutes’ when the acute-pain team did rounds. At this time, the patient’s observations were stable and it was thought the ‘turn’ may have been related to the patient’s ketamine infusion.
- Day 11 post-admission, the patient was well on waking. That morning, the patient suddenly became unresponsive and cardio-pulmonary resuscitation (CPR) was commenced (timely and by senior staff) but the patient was unable to be resuscitated.



## What issues are highlighted by this case?

- Trauma management of an obese patient is complicated.
- The type and timing of DVT prophylaxis in obese surgical patients is important.

## QASM recommendations:

- Consider carefully DVT prophylaxis (and dosage of chemical prophylaxis) in the obese emergency trauma patient.
- When delayed primary closure of traumatic wounds is planned, DVT prophylaxis requires careful management (considering bleeding from the wounds versus DVT or pulmonary embolus).
- Gastric banding patients who smoke are to be supported in cessation of smoking before and after gastric banding surgery (obese patients who smoke have a higher risk of DVT).





## Case study (4) (Neurosurgery)

### *Spinal surgery, sepsis and the obese patient: a fatal combination?*

The QASM assessor specifically stated that this case “highlights concerns regarding the indication for reoperation on a high-risk patient (obesity, hypertension, diabetes, obstructive sleep apnoea).”

A summary of the case follows.

#### The patient:

- was middle age
- was obese (BMI>30) (140 kilograms)
- had a surgical history including cervical spine surgery involving pre-existing occipital-to-C3 fusion/epidural abscess (10 years prior).
- had other comorbidities (hypothyroidism; hypertension; Type II diabetes mellitus; obstructive sleep apnoea)

#### What happened at hospital A?

- The patient was diagnosed as having cervical spinal stenosis and underwent cervical laminectomy, decompression and fusion at hospital A (tertiary referral hospital).
- Postoperatively, the patient returned home to a regional area.
- Two weeks postoperation, the patient felt unwell and had fevers.
- The patient was then referred, with a diagnosis of “febrile illness”, to the hospital where the laminectomy had

been preformed. In the emergency department, a diagnosis of wound infection was made. Advice was sought, from the surgical and cardiology teams, regarding abnormal ECG and calf swelling.

- Day two post-admission, the wound was explored (washout and closure were performed).
- Postoperation (wound washout), the patient was transferred to ICU due to intubation and ventilation difficulties experienced during the operation.
- Staphylococcus aureus was grown from the wound pus.
- The patient was extubated and remained stable in ICU.
- Day two postoperation, the patient was transferred to the ward with DVT prophylaxis and consideration for further surgery due to cervical wound infection.
- The infectious diseases unit was consulted and noted the past history of epidural abscess (ten years prior that required exploration and drainage, and spinal fusion).
- The patient progressed slowly (as noted in the ward) despite physiotherapy and continued intravenous (IV) antibiotics.
- It was decided that the patient had a ‘deep-seated’ surgical infection and that a cavity had developed.
- Plastic surgical advice was sought and IV antibiotics continued (as confirmed as appropriate treatment).



- Day four postoperation, the wound broke down and further washout was booked.
- Day five postoperation, the patient collapsed in the ward before the further washout. A code blue was called and CPR commenced.
- Intubation was difficult.
- Due to high CO<sub>2</sub> and high lactate a decision was made to cease resuscitation.
- The case was referred to the coroner. The likely cause of death was pulmonary embolism.

### What issues are highlighted by this case?

- The significant history for infection risk with obesity; type II diabetes; and cardiac disease (considering the patient had been home-based for two weeks prior to re-hospitalisation so the degree of mobilising was uncertain).
- The indications for re-operation on a high-risk obese patient.
- The importance of considering more targeted antibiotics in a diabetic with previous Staphylococcus epidural abscess when further surgery in the same area is being undertaken rather than simple prophylaxis with a Cephalosporin (for example Flucloxacillin or Vancomycin).
- Steroids will increase the risk of sepsis particularly in a diabetic who has had previous local abscess requiring surgery.

### QASM Recommendations:

- Comprehensive preoperation assessment is critical in complicated obese surgical patients.
- Consider carefully the indications for surgery and have discussions with multi-disciplinary teams.
- Absolute indications for surgery do occur but in each case the indications for surgery must be identified (and documented) for each individual patient.





## Case study (5) (General/ Vascular/Cardiothoracic)

### *When palliation becomes complex!*

The QASM assessor specifically stated “while the balloon angioplasty was technically feasible and was performed successfully, given the pre-morbid state of the patient and the level of risk, a clearer plan of action in the event of the development of irreversible renal failure, or other major setback, and an Advanced Health Directive from the patient might have limited the extent of the interventions, which ultimately only served to raise false hopes.”

A summary of the case follows.

#### **The patient:**

- was elderly
- was obese (BMI>30) (130 kilograms)
- had a medical history of severe aortic stenosis and coronary artery disease
- had other comorbidities (hypertension, Type II diabetes mellitus, chronic renal failure (stage four and not considered a candidate for long-term dialysis)

#### **What happened at the tertiary referral hospital?**

- The patient was transferred to the tertiary referral hospital for balloon angioplasty of aortic valve. (Note: the patient had been offered aortic valve replacement four years earlier but had refused intervention.)
- The patient had been an inpatient for five weeks with recurring left ventricular failure secondary to aortic stenosis and was unfit for percutaneous or open aortic valve replacement.

- Balloon angioplasty was performed via a right femoral artery approach.
- The procedure was successful, with significant reduction of aortic gradient.
- Post-procedure, the patient was monitored in the interventional suite. The patient reported feeling hot and uncomfortable. That evening the patient developed abdominal pain, became hypotensive and was acidotic. Urine output decreased. Melaena and a groin haematoma were noted. An urgent computed tomography (CT) was performed which apparently showed a haematoma and calcification of the superior mesenteric artery.
- A provisional diagnosis of iliac artery injury was made. An initial plan was made to manage the patient conservatively and the patient was transferred to the Coronary Unit at 2200.
- The Vascular registrar was not asked to review until the patient became hypotensive again at 0030, and the registrar concurred with the provisional diagnosis of iliac artery injury.
- An urgent aortogram was performed in the operating theatre, with a view to endovascular repair of the presumed arterial injury. This showed diseased coeliac and occluded superior and inferior mesenteric arteries and no iliac injury.
- An exploratory laparotomy was performed, finding ischaemic stomach, small bowel and transverse colon. Therefore, a bypass graft from common iliac artery to superior mesenteric artery was performed.
- The cause of the gut ischaemia was felt to be either thrombosis on the basis of hypotension or embolic from the earlier procedure.



- Day one postprocedure (morning), an asystolic arrest occurred which responded to resuscitation.
- Day two postprocedure, a re-look laparotomy occurred revealing a healthy viable stomach, small intestine, colon and rectum.
- The patient's renal function continued to deteriorate in the days following the laparotomy. Dialysis was commenced and the patient was reviewed by the renal team. Their opinion was that the patient would not regain sufficient renal function to be dialysis-independent, and therefore the patient was considered unable to have dialysis outside ICU.
- The patient remained intubated and ventilated and on a dopamine infusion.
- Day 13 post-procedure, dialysis ceased and palliative care instituted. The patient died three days later.

### **What issues are highlighted by this case?**

- The patient was offered balloon angioplasty as a palliative measure to improve quality of life. This particular palliative measure was complicated by gut ischaemia. This was an adverse event but is also a known complication of any procedure which involves passage of catheters through the aorta.
  - Why was this possible complication not considered preoperatively, given the clinical scenario of abdominal pain, melaena, and raised lactate? If it had been made preoperatively then a decision not to intervene could have been considered, on the basis of very low likelihood of eventual survival.
- As the gut diagnosis of ischaemia was made from the aortogram at operation, the vascular surgeon felt obliged to attempt to revascularise the gut. The operation was successful, but the patient had non-survivable comorbidities. It was inevitable that irreversible renal failure would develop (patient's age, pre-existing level of renal function, and the physiological insult).
  - Patient and family were aware that the patient was high risk but were more keen for intervention as the patient approached an end-stage condition.

### **QASM recommendations:**

- The surgeon must acknowledge the importance of avoiding intervention in the presence of non-survivable comorbidities.
- Education about clinical scenarios that arise post-surgery in obese patients is critical.
- The need to clearly "red flag" (in documentation) any previous patient "refusal" of surgical intervention and consider this when suggesting further intervention.
- Palliative measures must not make the patient worse.
- The decision to 'not proceed to surgery' requires inter-specialty discussion (regarding clinical ethics and the place for palliation), and support for individual clinician training in effective communication (for these scenarios).



## Case study (6) (General)

### *Late consultations can kill!*

The QASM assessor specifically stated “the surgical team were put in a very difficult position by what appears to be rather late consultation from the intensive care unit. It appears that it was not immediately considered probable that haemorrhage was the cause of the patient’s collapse despite the sharp drop in haemoglobin. It does seem likely that the pathology was a retroperitoneal infection leading to acute haemorrhage.”

A summary of the case follows

### **The patient:**

- was middle aged
- was obese (BMI>30) (130 kilograms)
- had a medical history including previous cholecystectomy; insulin-dependent diabetes; and treatment for diabetic foot ulcers.

### **What happened at the tertiary referral hospital?**

- The patient was referred for foot and hand infections, from a peripheral hospital to the tertiary referral hospital.
- The patient was hypotensive and acidotic, and it was felt that the patient was suffering from diabetic ketoacidosis.
- There was a suspicion that the patient had myocardial ischaemia.
- Blood pressure was 90/50. Pulse rate was 115 bpm. Intravenous antibiotics were commenced. A large loading dose clopidogrel was given.
- The patient was admitted to the High Dependency Unit (HDU). Clopidogrel was continued at 75mg daily.
- Day one post-admission, a nurse noted that the patient was complaining of left-sided lower back pain.
- Day five post-admission, the patient was readmitted to the Coronary Care Unit (CCU) with SVT. This was treated appropriately and settled quickly, and the patient was discharged back to the ward.
- Day eight post-admission, the patient complained of left-flank pain. At approximately 1350, a Resident saw the patient and determined that the patient had a localised back problem. The Resident recorded that the pain had subsided and that the patient had no abdominal pain. At approximately 2230, the patient complained of feeling hot and dizzy. Blood pressure 70/48. An attempt was made to return the patient to bed but the patient collapsed and then appeared to have a cardiac arrest.
- CPR was commenced and the patient was transferred to ICU. In ICU, it was noted that the patient was anaemic and continued to require volumes of intravenous fluid. The following morning, the haemoglobin was 81 g/L\*. That night, it was 53 g/L, and by 0130 it was 39 g/L.
- The patient then was given a blood transfusion with blood pressure remaining reasonably stable but haemoglobin had only risen to 68 g/L by 0500 (after 4 units of blood). Importantly, the patient was anuric throughout the night.





- Request for CT scan was only made at the beginning of the 'ordinary' working day.
- The scan revealed a large retroperitoneal haematoma which then prompted a referral to the on-call surgical team.
- The patient was taken to the operating theatre at 1100.
- The surgery was difficult due to the patient's morbid obesity. Another surgeon was called to assist.
- The patient was found to have a large retroperitoneal haematoma around the iliac vessels. No discrete bleeding point could be found although the visibility was extremely poor and the bleeding continued.
- The decision was made that the situation was irretrievable (perhaps better considered before operating). The abdomen was packed and the patient returned to the ward with the expectation of non-survival. The patient died later that day.
- Physical difficulties and support are needed when operating on an obese patient: "no discreet bleeding point could be found although the visibility was extremely poor and the bleeding continued", and "the surgery was very difficult in keeping with obesity - another surgeon was called in to assist".

### **QASM recommendations:**

### **What issues are highlighted by this case?**

- Situational awareness by the surgeon is paramount and should result in irretrievable situations being considered much more comprehensively before surgical interventions.
- Situational awareness by the intensive care staff is paramount (but in the above scenario, it seems to have been lost as the haemoglobin fell progressively without apparent recognition or intervention).
- Adequate staffing, during overnight shifts in intensive care, is essential for quality care.
- Medical and surgical specialties must collaborate early with complex patients.
- Operating theatres must be set up to deal with obese patients and equipment should be ready before the patient arrives in the room. Equipment could include extra large retractors, large BP cuffs, double arm boards, and elongated instruments.
- Surgeons must always consider the in-theatre assistance required before operating on obese patients.
- Surgical consultation should have occurred at the time the likelihood of haemorrhage was recognised and before CT scan.
- If the surgical team had been able to operate 8 to 10 hours earlier, it would probably still have been difficult.



### **\*Reference range for haemoglobin**

Adult female Hb: 115-165 g/L

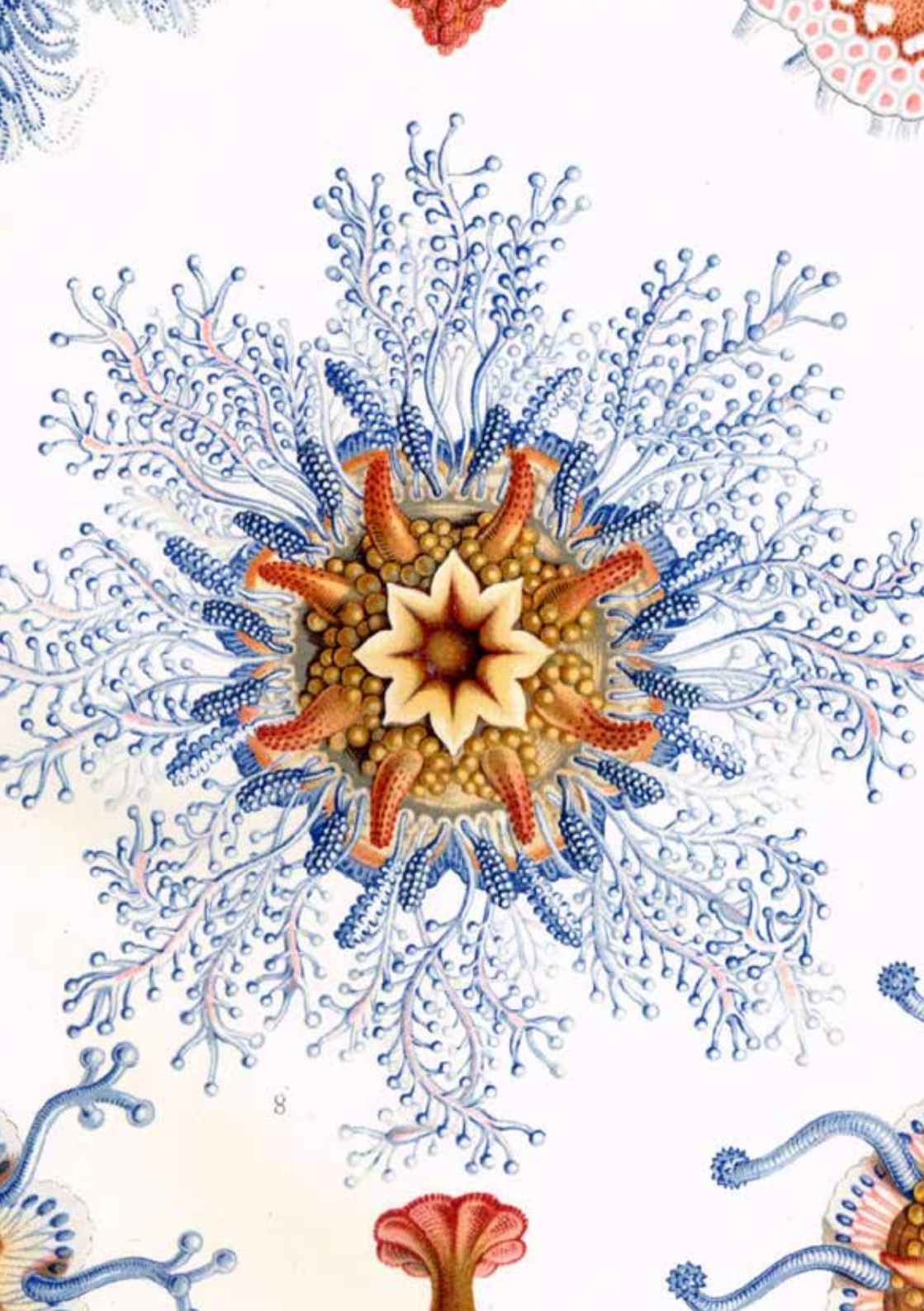
Adult male Hb: 130-180 g/L

Ref: RCPA manual; the Royal College of Pathologists of Australia website

<http://www.rcpamannual.edu.au/>

Accessed 10.07.2014.







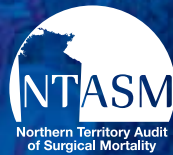
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