SAFE ANAESTHESIA LIAISON GROUP

PATIENT SAFETY UPDATE

1 January 2023 – 30 June 2023

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LEARNING POINTS FROM REPORTED INCIDENTS

This issue of PSU begins with two special pieces, one about the risks to anaesthesia breathing circuits of heavy items crushing the system hoses, and the other about the dangers of chlorhexidine-containing central venous catheters to patients with an allergy. It then concludes with the usual review of incidents, this time those reported to NRLS between 1 January and 30 June 2023, and reported by 28 June 2023.

Protecting anaesthesia breathing system hoses from crushing and occlusion

Background

The breathing system hoses and associated capnograph tubing on anaesthesia workstations are at risk of being crushed or run over by mobile theatre equipment and occluded which, in the severest cases, can lead to significant patient harm or death.

Index events

In a recently reported case[1,2] the coroner determined that a young woman had died at the end of routine anaesthesia when the breathing system was run over by the wheels of the bed or some other theatre equipment. No *Report to Prevent Future Deaths* was issued.

Additionally, the Association of Anaesthetists received personal communication from an anaesthetist following a separate clinical incident where the wheels of the anaesthesia workstation had occluded their patient's breathing system. This led to amendments to the bronchospasm page in the Association's *Quick Reference Handbook* for anaesthesia emergencies.[3]

Following these events, a structured search was made of incidents reported to the *National Reporting and Learning System* (NRLS) and *Learning From Patient Safety Events* (LFPSE) and this identified eight incidents where a breathing system was obstructed by compression; three of these were by the anaesthesia workstation wheels, three by bed or trolley wheels, one where a system became trapped in the anaesthesia workstation drawer and one with unknown mechanism, but with evidence of crushing.

There is therefore an ongoing risk of breathing systems and/or capnograph tubing being crushed or run over and obstructed by the wheels of the anaesthesia workstation, but also by the wheels of operating tables, trolleys, beds and any other sufficiently heavy wheeled equipment that comes into the operating theatre. There is a risk of systems becoming compressed between two pieces of equipment, but this appears to be a lesser risk.

What protections exist?

Mobile X-ray machines provide an interesting comparison. The wheels of these machines invariably have cable deflectors built into the front and back of their casters [Figure 1]. The purpose of these is to deflect and prevent damage to the expensive cables that run to the C-arm. This does not appear to be a requirement of an ISO standard, but is presumably a response to product feedback and lessons learned in the field.

Of the main anaesthesia workstation manufacturers, Mindray, GE and Drager now offer a similar feature [Figure 2]. Ideally the protection would be on the leading and trailing sides of the caster, as occlusion can occur at either, and this is not universal. Nonetheless, including this protection is a very welcome development. Some items, for instance the Hill-Rom PST500 operating table [Figure 3], have shrouding of the wheels, but not sufficient to prevent rolling over a breathing system because the shroud does not reach fully to the floor when the wheel is in contact with the floor.

The CASTrGARD[4] [Figure 4] is an aftermarket device that can be fitted to existing anaesthesia workstations to act as a hose and cable pusher. We are not aware of any other such device.

The ISO governing anaesthesia workstations does not require cable or hose deflectors to be fitted to casters.[5]

SALG makes a number of recommendations:

1. Anaesthetists and those working with them should take precautions to protect the breathing circuit from occlusion:
    a. Use the shortest circuit practicable
    b. Ensure the breathing system is routed safely along its entire length, including the use of tube holders as a routine
    c. Take measures to ensure breathing circuit/capnograph lines are never on the floor. This may require suspending them in between machine and patient [Figure 5]
    d. Take extra care at times of particular risk, particularly when moving the anaesthesia workstation and moving patient trolleys and operating tables.
2. Organisations should take steps to reduce the risk:
    a. They should audit the risk in their theatres and consider at a minimum adopting CASTrGARD or similar devices
    b. They should procure and use the shortest possible breathing system for each operating theatre. Long circuits should not be provided unless clinically necessary.
    c. They should ensure staff working in the theatre environment are educated about this risk.
    d. In the future, they should consider procuring equipment that includes protection against this risk in preference to equipment that does not.

LEARNING POINTS FROM REPORTED INCIDENTS

Those responsible for critical care areas should be aware of this communication. It is likely to be relevant in critical care areas as well, where ventilator breathing circuits may be exposed to similar risks. We will share the report with national critical care organisations.

ISO should examine this risk and consider mandating engineered solutions in future standards covering anaesthesia workstations and other relevant wheeled equipment likely to enter theatre. They should also consider the same in relation to critical care areas. We will share this report with ISO and its representatives.

Manufacturers should consider, even in the absence of any ISO mandate, voluntarily making changes to the design of casters of relevant equipment so that they cannot run over hoses. We will share this report with manufacturers and their trade bodies.

NHS Patient Safety should consider the need for an alert on this topic. We will share this report with them.

References

1. Hospital Trolley Probably Caused Teenager's Death, Coroner Says. *BBC News*, 9/11/2022.
2. Teenager Died After Breathing Tube Became Blocked, Coroner Finds. *Guardian*, 9/11/2022.
3. Quick Reference Handbook. *Association of Anaesthetists*, 2023.
4. Castrgard. Accessed 4/1/2024.
5. Medical electrical equipment — Part 2-13: Particular requirements for basic safety and essential performance of an anaesthetic workstation.

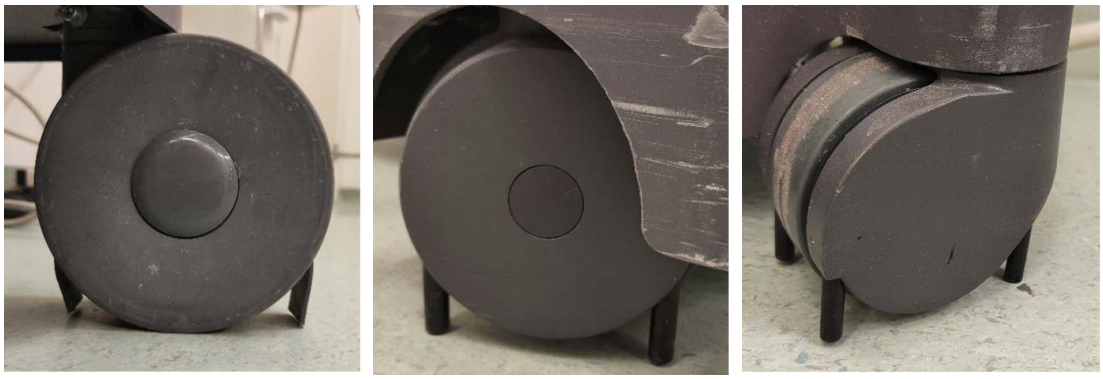

Figure 1: Wheels of mobile X-ray machines, showing cable deflectors, at front and back of all castors, and reaching fully to the ground.

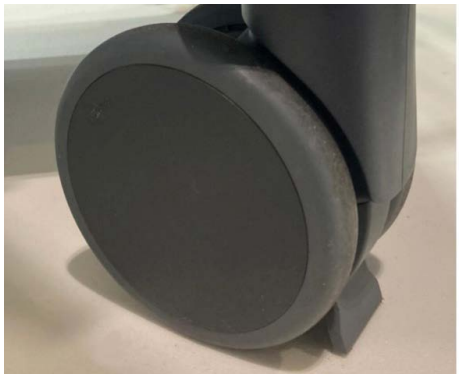

Figure 2: Wheel of Mindray A9 anaesthesia workstation, showing cable deflector on leading edge

Figure 3: Wheel shroud on an operating table, showing incomplete deflection protection (metal post is deployed table brake, which retracts when table is to be moved)

Figure 4: CASTrGARD in use

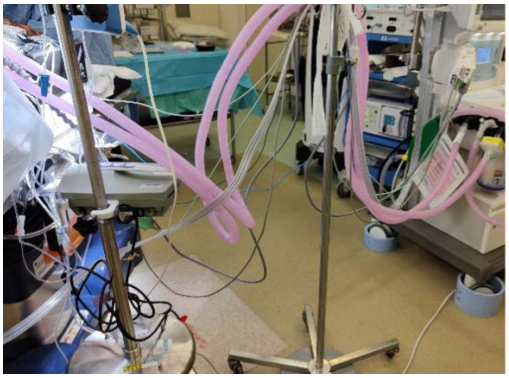

Figure 5: Example of a long breathing system being suspended to prevent trailing on floor

Chlorhexidine allergy

We received correspondence about a case in which a patient with known chlorhexidine sensitivity had a chlorhexidine-impregnated central line inserted and suffered a fatal anaphylactic reaction. Readers may have seen the letter in Anaesthesia News.[1] The authors make the point that NAP6[2] identified chlorhexidine as the third most common trigger of anaphylaxis, being responsible for 10% of cases (0.78 per 100,000). The recommendation in the report of NAP6 said "*The MHRA should work with manufacturers of medical devices… to ensure that products are labelled clearly and prominently, to identify whether they contain chlorhexidine or not*". The MHRA released a Medical Device Alert in 2012 on this topic.[3]

The letter authors pointed out that ISO specifies an approved symbol to identify when a product contains latex [Figure 1]. They suggested that it would be sensible to have such a symbol for chlorhexidine, given that it is a more common cause of anaphylaxis than latex.

As a consequence, we have made contact with representatives who sit on the relevant ISO committees and they are going to take this suggestion forward. For those with an interest in the detail, to complete the work would require adding a new symbol in ISO 15223-1 (Medical devices – symbols to be used with information supplied by the manufacturer) and updating ISO 10555-1 (Intravascular catheters - Sterile and single-use catheters) to require its use. Even without this, ISO 7000-2725 (Graphical symbols for use on equipment — Registered symbols) means that manufacturers can already use the triangle symbol to warn of any substance in medical devices, with whatever text they choose, but it would not be standardised. We will highlight this with our industry partners.

As an invasive procedure, central line insertion comes under the auspices of NatSSIPs and consequently organisations should have a LocSSIP to cover it. As an additional safeguard, organisations could include a specific question to check whether or not the line selected contains chlorhexidine.

References

1. Panesar GS, Hanmer SB. Highlighting inadvertent exposure to chlorhexidine in medical devices. *Anaesthesia News*, September 2023.
2. Garcez, T. Chlorhexidine. Anaesthesia, Surgery and Life-Threatening Allergic Reactions: Report and Findings of the Royal College of Anaesthetists' 6th National Audit Project - Perioperative Anaphylaxis. *Royal College of Anaesthetists*, London 2018. [Accessed 4/1/2024].
3. Medical Device Alert (MDA 2012/075): All medical devices and medicinal products containing chlorhexidine - Risk of anaphylactic reaction due to chlorhexidine allergy. *MHRA*, 2012.

Figure 1: ISO symbol for items containing latex

Arterial placement of central venous catheters

Case 1: *"Patient admitted last night and had central line inserted. Inotropes, sedation and fluids given via central line for 4+ hours. On assessment [in morning], noted CVP reading high and an arterial trace, suspected that central line was in artery. All infusions stopped and transferred peripherally. Patient became hypotensive and metaraminol given neat by anaesthetist. Patient became profoundly bradycardic and peri arrest… on review of the never event guidance this incident is a never event under the wrong site surgery category."*

Case 2: *"Patient admitted to ITU with liver impairment and AKI secondary to mass in head of pancreas causing biliary obstruction. Need for central venous access and dialysis line for urgent treatment. Both lines inserted sequentially to right internal jugular vein. Ultrasound guidance used for both procedures, same operator. CVVH line correctly sited. CVC line had in fact been inserted into carotid artery despite use of ultrasound. CXR post-procedure, with hindsight shows the 2 lines taking very separate paths and would be difficult to interpret that they were in the same vessel. CVC line was apparently transduced. It is unclear how the interpretation of the CVC pressure was made but a recording of MAP value 60-80 was apparently recorded but not acted upon… the patient was sedated and intubated in preparation for a PTC. As attempts were made to attach a propofol infusion to the CVC after intubation pulsatility in the CVC was noted. Re-transducing the CVC revealed an arterial waveform. The CVC line had been used for infusion of FFP but not for any medication."*

Case 3: *"Patient had Central line inserted on admission to critical care for vasopressors, for management of sepsis, by ICU resident. 2 lines sited (CVC and VasCath) at same time into Right side of neck. Vasopressor infusions (Noradrenaline) were started through the CVC overnight. The following day the patient was confused and the decision was to sedate, intubate and ventilate to facilitate a PTC drain, as believed would not tolerate procedure. FFP was started to correct coagulopathy pre-procedure, which was running through the CVC transduced line. After induction of anaesthesia a propofol infusion was connected to the CVC (to maintain sedation) and pulsatile flow was noted. The transduced pressure in the CVC was checked and shown to be consistent with arterial trace. Vasopressor infusion (Noradrenaline) was stopped and converted to peripheral vasopressor (Metaraminol). The patient went for a CT scan which confirmed the CVC was sited in the common carotid artery… The CVC was removed from the carotid artery through an Interventional Radiology procedure and returned to critical care."*

Although these cases presented on ICU, they are valuable lessons to all anaesthetists. Checks to exclude arterial placement of central venous catheters should always be undertaken before the line is used. These should be set out in each organisation's LocSSIP governing central line placement. It is not clear which confirmatory checks were used in all cases, but in case 2, it appears that a non-reassuring check (presence of arterial pressures) was not acted upon and the line was used anyway.

Neurosurgical transfer delay

"Neurosurgeons informed us [at a time in the early morning] of a patient coming from [DGH] intubated with isolated head and a blown pupil. We were informed [at a time 55 minutes later] that they were just leaving and that he had blown a second pupil. He arrived at [tertiary centre] at [a time 40 minutes after the second call (1hr and 35 minutes after the original notification)]. On arrival the pupils were unreactive and it was decided that it was too late for interventions. Looking at the transfer document ambulance was ready [at a time 8 minutes after the original notification] so there was an hour in [DGH] ED which may have changed the outcome. The patient was transferred by the SpR who starts [15 minutes after the original notification]. Handing over takes time and I have concerns that this may be the reason for the hour delay".

This incident demonstrates the logistical challenges of managing urgent cases that arise around the time of handover from one shift to another, particularly when allocating transfer-trained anaesthetist to out of hospital transfers. Local guidelines should recognise and address this issue, including clear communication structure and, for instance, contingencies around re-contacting the referring centre if updates on progress are not received. The Association has published a guideline document on transfer of the brain injured patient.[1]

Reference

1. Safe transfer of the brain-injured patient: trauma and stroke. *Association of Anaesthetists*, 2019.

Can't intubate, can't ventilate

"Patient scheduled for bilateral ureteric stent secondary to bilateral stones causing bilateral hydronephrosis, acute renal failure with anuria. On induction of anaesthesia unanticipated difficult airway and cannot intubate cannot ventilate scenario with front of neck access to secure his airway."

This event is useful as an example of DAS Plan D in action.[1] It would be very helpful and hopefully reassuring for anaesthetists reading this vignette to know the outcome. Whilst a difficult airway was not anticipated prior to induction, in retrospect there will be factors that would have led to difficulty in intubation – perhaps airway oedema in association with acute renal failure.

Reference

1. DAS Guidelines for Management of Unanticipated Difficult Intubation in Adults, 2015. Difficult Airway Society (DAS).

Anaphylaxis

Case 1: *"Patient required urgent surgery for empyema. On amoxicillin and metronidazole. Mildly hypotensive following induction of anaesthesia. Treated with fluid and metaraminol. Easy FM ventilation. Intubated with 41Ch L DLT, position confirmed with waveform capnography, but high airway pressure alarm on ventilator, rapid desaturation and marked hypotension. Called for help. Chest examined; bilateral wheeze/crackles. Increasingly difficult to ventilate, purulent sputum +++ observed in ETT so suctioned, but still difficult to ventilate and severely hypoxic/cyanosed therefore DLT removed and hand ventilated in case DLT obstructed. Simultaneously to this 50mcg adrenaline given due to hypotension refractory to multiple boluses metaraminol. Able to hand ventilate via FM. Rapid recovery of oxygenation and BP following adrenaline and chest much improved on auscultation. Reintubated with single lumen COETT… Reviewed incident… Pt suffered no/low harm as per CT governance anaesthetic lead. Referral form for anaphylaxis attached, however tryptases not completed. On ICE NO tryptase rise thus less likely anaphylaxis. Possible extreme histamine release to atracurium with bronchospasm/hypoxia leading to peri-arrest situation, or tube blockage leading to same events as per reporter. Will ask anaphylaxis lead re likelihood of anaphylaxis on this basis and onward referral to [allergy service]. Possible anaphylactic reaction following induction of anaesthesia, noted severe chest infection with empyema present, hence difficult to differentiate.*

Appropriately acted upon. Anaphylaxis and supportive treatment instituted with good effect. Anaphylaxis referral done. Investigations performed."

Case 2: *"Patient scheduled for elective surgery (total laryngectomy plus neck dissection and pectoral flap). Patient assessed as ASA-4, fragile with multiple comorbidities and allergies (anaphylactic type) to a broad range of drugs (antibiotics, NSAIDs, neuroleptics). Initial management of awake tracheostomy successful, with no incidents. During team brief antibiotic cover is discussed: as the patient refer anaphylactic reaction to penicillins and cephalosporins as well as clindamycin, the decision is made to use teicoplanin (in normal use of diluted in 250ml bag of fluid), metronidazole, and gentamicin. Stable throughout the administration of gentamicin and metronidazole, at the beginning of teicoplanin, started to be evident that airway pressures are increased, and rapidly the peripheral pulse trace of the invasive blood pressure is lost. No initial response to metaraminol, and recognising the situation as anaphylaxis, the alarm is sounded, crash trolley in… and help is immediately available with senior anaesthetists and on call ICM Consultant. Started CPR immediately due to the lack of proper recordable blood pressure. Pads of defib applied. Hydrocortisone 100mg iv given. Fluids infusions started, Adrenaline boluses given. In total 8 mg of adrenaline for a total of 35 min downtime. Initial stability gained through the 6-7 mg of AD and the 5th litre of fluid. CVL under US inserted, AD infusion started and later on Vasopressin. Stability after ROSC with no further episodes of desaturation, low BP or instability. EtCO2 present at all times throughout the management of the reaction. Change of flexible surgical trache tube for formal trache tube and transfer to ICU, sedated and ventilated."*

The organisation's own review identified good teamwork during CPR, with leadership moving between consultants, with no evident delays in treatment. There were no issues accessing equipment. The Quick Reference Handbook was not accessed during the resuscitation; it was not clear why. The team had a debrief after the event followed by a later formal debrief where some learning points were identified. There was good recognition and declaration of emergency with appropriate calls for help. Good support attended, with excellent teamwork recognising the importance of leadership, and closed loop communication. Good contemporaneous documentation by appointment of a 'scribe'. Allergy status had been discussed at team brief, and an appropriate plan was made for prophylaxis; the microbiologists agree they would have advised the same combination. The team engaged with all elements of the Safer Surgery Checklist. The patient made a good recovery from the episode without neurological injury, but is now on a non-surgical pathway for ongoing treatment.

NAP 6[1] identified teicoplanin as a significant causative agent for anaphylaxis during anaesthesia. In this case, it seems good preparation and good teamwork produced a good outcome. It is worth pointing out that the latest guidelines on anaphylaxis do not include hydrocortisone; prompt administration of adrenaline is key and nothing should delay that. The latest version of the Association of Anaesthetists Quick Reference Handbook[2] includes this change.

Readers might consider the barriers to use of the QRH that exist in their own departments and what could be done to remove them. For example: simulation, "table top" exercises, checking prominent placement, educating related staff groups such as ODPs. The reporters said a scribe was appointed but we may all need more practice at assigning a reader of the QRH including consideration of who that would be and how that fits into the work flow of the resuscitation.

Case 3: *"Patient presented for fem-pop bypass electively. On induction of anaesthesia was given 100ug fentanyl followed by 100mg of propofol and 35mg atracurium (both given about 1 minute post fentanyl). Initially noticed a diffuse red rash around the patients face and commented that we should not give further atracurium. The 1st blood pressure did not record but patient had a peripheral pulse. We proceeded to intubation as we thought this would cause a sympathetic response, intubation was successful and no sign of bronchospasm, anaesthesia maintained with isoflurane. Blood pressure recorded as systolic of 50 so 1mg metraminol given and fluid bolus and patient positioned head down, a repeat dose of 0.5mg followed by 9mg ephedrine given. A further blood pressure recorded systolic of 50. Adrenaline 50mcg given - despite an increase in heart rate the peripheral pulse disappeared. Blood pressure recorded of 30 systolic, no palpable pulse and loss of sats trace (co2 maintained). Declared cardiac arrest and pulled the emergency buzzer. Pads applied and patient PEA on ECG monitor. The rest of the adrenaline syringe given (950 mcg). Patient got ROSC after roughly 2 minutes of CPR. Blood pressure recovered to a systolic of 160 and remained maintained around their normal value for that point. Decision to abandon operation and take to ICU - patient successfully extubated in the meantime. Discuss with patient had a referral to allergy team completed."*

The case illustrates the importance of using adrenaline as the first line vasopressor in cardiovascular collapse due to suspected anaphylaxis, commencing CPR if the systolic blood pressure is 50 mmHg or less.[1]

Case 4: *"Patient was induced for orthopaedic surgery. NKDA. She developed high airway pressures and a low blood pressure following teicoplanin (approx 400mg given). The likely anaphylaxis was recognised, surgery was stopped, adrenaline (50mcg boluses) were administered and the emergency buzzer was pulled… Possible anaphylaxis treated correctly"*

Case 5: *"Cardiac arrest in theatre following administration of antibiotics. Probably anaphylaxis"*

All of these cases remind us that anaphylaxis can present to any of us at any time and that it is important to have the right equipment, drugs and cognitive aids immediately available.

References

1. Anaesthesia, Surgery and Life-Threatening Allergic Reactions: Report and Findings of the Royal College of Anaesthetists' 6th National Audit Project- Perioperative Anaphylaxis. *Royal College of Anaesthetists*, London 2018 [Available: Accessed 4/1/2024].
2. Quick Reference Handbook. *Association of Anaesthetists*, 2023.

Inter-hospital transfer of critically-ill patient

Case 1: A consultant on-call for ICU in a tertiary centre was contacted by a consultant cardiologist in the same centre to say they had been made aware that a ventilated patient was being transferred from a referring hospital after a cardiac arrest, possibly due to a STEMI: *"Other clinical details unclear but reported to have had an approximately 1-hour downtime with Lucas Device chest compressions. Requesting urgent assistance. I confirmed that ICU or Anaesthesia teams had no prior knowledge of an incoming transfer but would make rapid enquiries with [referring unit] colleagues and organise a receiving team. Also confirmed we would make an available ICU bed to support. Cardiology consultant informed me that there was no available cath lab currently and they were not on-call but would stay to treat the patient given the cardiologist who was meant to be on-call was in another unit. Contacted Anaesthesia Consultant On-Call to forewarn of likely need for urgent assistance. They immediately proceeded to organise a team including themself, ODPs and Anaesthesia registrars in cath labs. Called [referring hospital] ICU Consultant … and requested patient details, status and ETA … they had no specific knowledge of a patient but that their registrar had been at a trauma call in ED for a prolonged time. Requested call back with any details… informed that transfer team have already left from ED with a different Consultant. No further clinical or patient information, nor destination. On arrival in cath lab, the patient was found to be intubated/ventilated and in respiratory extremis with oxygen saturations in the low 80s on 100%. There were only 4 pieces of paper with the patient, none of which were formal medical records (e.g. A4 page with scribe details of ALS events) or labelled with accurate patient information. Multiple aspects of events being reported by Retrieve team (such as Anterior STEMI pattern on ECG, thrombolysis) were not evident in the notes with the patient."*

The ICS has published guidelines for standards of transfer of critically ill adults,[1] which say *"The poor quality of documentation and handover between providers is consistently identified as a factor in adverse events with multiple studies suggesting that improved communication is a key to reducing errors" and "Clear records should be kept at all stages. These should include details of the patient's condition, reason for transfer, names of referring and accepting consultants, clinical status prior to transfer and details of vital signs, clinical events and therapy given before, during and after transport."*

It is hard to add to this advice, which clearly was not followed in this case.

Case 2: *"Patient admitted to ITU… with peri arrest secondary to hypovolemic shock… [Next day] patient was put for CT head (urgent) r/t unequal pupil size. CT dept book the porter for the allocated time for the patient, only one porter arrived to accompany the patient, who is intubated and ventilated. Myself and Dr. asked him if he can push the bed alone, he said he can manage as he expressed they are short of staff. ITU Dr. was not happy as he has to push the door, check on the patient, look for airway patency and I am holding the transfer bag. After CT scan while getting the patient out from CT suite patient had brief period of loss of cardiac output. CPR commenced; arrest call raised team arrived within 5 mins patient gained ROSC in 5 cycles with 3 Adrenaline. Patient shifted back to ITU at this time porter with his supervisor accompanied the patient. ITU Dr did raised his concern to the porter supervisor to make sure ITU patients should always be accompanied by two porters especially when they are intubated and ventilated."*

Although this second case was an intra-hospital transfer, many of the principles of the ICS guidelines still hold true. Organisations should have written standards for these types of transfer, including minimum personnel need for each type of transfer. Medical and nursing staff should not accept a lesser standard.

Reference

1. Transfer of the Critically Ill Adult. *Intensive Care Society*, 2019.

Awareness during TIVA

"Accidental awareness under general anaesthesia. The patient had explicit recall after IV line for total intravenous anaesthesia became disconnected during surgery. The line disconnection was noticed by the consultant anaesthetist after a rise in the BIS number despite increasing the propofol and remifentanil infusions. This was a rare but recognisable complication of TIVA, there was no obvious malpractice present."

Accidental awareness with TIVA is commonly due to failure to deliver the drugs through i.v. cannulae. Previous guidance suggested that the i.v. cannula should be visible at all times but current guidance from the Association[1] acknowledges that this is not always possible. The same guidance recommends the use of Luer-lock connectors; it is not clear if that was the case here. The cannula site should

be inspected immediately if the patient's response to the infused drugs appears less than would be expected, as happened in this case. The Association also has guidance in its NAP5 Handbook on how to proceed when awareness is suspected or confirmed, including detailed guidance for follow-up.

References

1. Safe Practice of Total Intravenous Anaesthesia TIVA. *Association of Anaesthetists*, 2018.
2. The NAP 5 Handbook: Concise Practice Guidance on the Prevention and Management of Accidental Awareness During General Anaesthesia. Association of Anaesthetists, 2019.

Pre-assessment and consent

"Patient is cancer Pt that needed to have urgent hysterectomy under the Gynaecology Team at [DGH satellite] scheduled... She had F2F pre-assessment by a pre-assessment Nurse [two weeks beforehand]... together with her niece as Pt lacks capacity. Pt is with phenylketonuria which had not been communicated to anyone further and patient arrived for surgery without being referred to Consultant Anaesthetist review. When I spoke extensively to the family and explained to them the complexity of the situation, that there are very few patients that had undergone general anaesthesia for major surgery with this metabolic disorder and that there is very high likelihood for intra and post-operative complications for patient's health that cannot be exactly predicted and quantified this was shocking news to them. Patient's nephew and his wife preferred to defer the operation for today until they have some time to think about the situation and decide what should be their decision as they are patient's NOC as she lacks capacity."

As doctors, anaesthetists are taught about a wide range of rare conditions which might affect the conduct of anaesthesia and the patient's perioperative course. It is not possible for individual guidance to be provided for preoperative nurses about each of these conditions. However, this patient's lack of mental capacity associated with phenylketonuria should prompt a referral for a notes review by a Consultant Anaesthetist prior to admission. The Association is currently updating its guidance on consent[1] and publication is expected in the first half of next year. Shared decision-making has a much higher profile now and this is likely to increase.[2] This case is a good example of how it is vital to explore what is important to the patient and when necessary to involve the people close to them.

References

1. Consent for Anaesthesia. Association of Anaesthetists, 2017.
2. Meek, T. Raising the bar: striving for excellence in consent. *Anaesthesia* 2023; 79: 7-10.

Problems on transferring from operating table

A patient returned to theatre for a wound exploration and wash-out, two days after more extensive surgery for necrotising fasciitis. *"Patient on the operating table, fully reversed breathing spontaneously with assistance from pressure support. Being moved to bed, coughing. Switched to manual vent. Many hands required due to the size of the patient. Not recorded but >100kg. Transferred across, saturations below acceptable and BP below acceptable BUT both monitoring devices inappropriately placed. Sats probe somewhere tangled in the sheets and the arterial line transducer on the floor under someone's feet. Monitors being replaced and positioned appropriately, pulse check done at the carotid, pulse not felt. CPR started. 2222 call put out and adrenaline sought from the anaesthetic room."*

The patient remained ventilated on ICU for about 20 hours. The organisation's post-event analysis considered what may have been the cause of the collapse and what learning points exist. TOF monitoring had been used and had shown reversal. Several cardiac causes were considered, but post-op ABGs suggested a primary respiratory cause, maybe leading to hypoxia and cardiac depression. It was suggested that, on reflection, perhaps planned ventilation at the end of the operation would have been indicated. The team reflected that the noise and chaos at the time of moving the patient was not helpful and could have perhaps been controlled better. They made the observation that monitoring systems that are transferrable between anaesthetic room, theatre and recovery and allow continuity of monitoring at all times would have allowed more attention to focus on the business of promptly transferring the patient to their bed. This case reinforces the need for quiet in theatre, leadership from anaesthetist and clear understanding of everyone's roles during the transfer.

Neurological problem after spinal anaesthesia

"Emergency operating patient for a below knee amputation. He had previously had the amputation of three toes [four days previously] under a local block, also on the emergency list. Assessed as unfit for general anaesthesia. Arterial line inserted prior to spinal anaesthesia. Senior trainee [ST7] attempted a spinal block with the patient in the standard sitting position but was unable to succeed. We then helped the patient into a left lateral position, used a forced air warmer and a low dose of propofol sedation for patient comfort and I tried to site the spinal at several levels before being successful at a higher level. Clear CSF seen and local anaesthetic injected without resistance. No pain reported by patient at any stage. The block developed as expected. Surgery was successfully completed, and patient went to recovery and then the ward uneventfully. I was called by the vascular surgeons yesterday afternoon [five days after

procedure] to say they suspected a cauda equina syndrome and had done an MRI that was being reviewed. I went to see the patient… patient is incontinent of urine and faeces and can't move either of leg suggesting spinal nerve injury. As part of my duty of candour I explained that this may be a very rare complication of spinal anaesthesia. Patient has since had another MRI scan and review of them by neurosurgery, I understand there is no intervention that patient might benefit from and he has been referred for spinal rehabilitation."

Cauda equina syndrome has been previously associated with neurotoxicity from drugs such as hyperbaric lidocaine.[1] Its incidence has decreased but still remains a rare complication of spinal anaesthesia. Conus damage may also present with similar pattern of bowel and bladder dysfunction and may be associated spinal needle insertion in or above the L3/4 interspace.[2]

References

1. Drasner, K. Lidocaine Spinal Anesthesia: A Vanishing Therapeutic Index? Anesthesiology 1997; 87; 469-472.
2. Reynolds, F. Damage to the Conus Medullaris Following Spinal Anaesthesia. 2001; 56(3): 199-298.

Regurgitation-aspiration in emergency surgery

Case 1: *"Patient was booked for left inguinal hernia repair +/- bowel resection in CEPOD. Post-op during removal of I-gel, the patient vomited and aspirated. The patient was intubated and an NG tube was placed."*

Case 2: *"Patient attended theatre for debridement/drainage of haematoma on lower leg. Despite being appropriately fasted, patient aspirated large volume of gastric content around the time of LMA insertion. Managed with suction, intubation, airway toilet and initially stabilised. Shortly after transfer to theatre became more hypoxic, ICU consultant attended to assist. Bronchoscopy and further airway toilet performed, plus recruitment manoeuvres. Continued deterioration over the next 60 mins or so, with worsening hypoxia and cardiac failure, despite further bronchoscopy and inotropic drugs. Second ICU consultant attended theatre but consensus from ICU and anaesthetic consultants was that situation was futile. Patient died in theatre."*

Clinicians must assess the risks and benefits of using supraglottic airways in emergency cases.This was an emergency list and the operation included the possibility of bowel resection. Many anaesthetists would have chosen tracheal intubation from the outset. Nothing is mentioned about the seniority of the anaesthetist or level of supervision. Case 2 is a reminder that even in surgery for non-abdominal pathology, assumptions about adequacy of starvation in emergency patients may be falsely reassuring.

Airway emergencies in the ED

Case 1: *"Patient admitted to ED following 3/7 hx of sore throat, identified by SpR as being acutely unwell, moved to monitoring for closer observation, pt had audible stridor and low sats. Dr prescribed all necessary medications and these were given promptly by nursing staff. Medics requested anaesthetic review alongside ENT review, ENT reg attended department from [nearby tertiary centre, 10 minutes away by road] and examined and plan was discussed with HDU at [tertiary centre] for transfer when stable and suitable to do so. Nursing staff voiced concerns of nursing pt in monitoring bay and that resus was more appropriate which was dismissed by anaesthetics on more than one occasion. As further discussions took place regarding where pt should go pt deteriorated significantly and airway was at significant risk of being lost, joint decision between anaesthetics and ENT for immediate transfer to theatre for intubation. Grab bag taken from resus for transfer with ENT calling theatres to be ready and have emergency trachy kit available - nursing staff advised theatre not ready but 'should be by the time we get there'. Transfer taken despite queries from nursing staff and SpR in ED. On arrival to theatre no staff available and theatre not prepped ready for procedure - pt began to deteriorate further team were advised by SN that sats were now dropping into the 50's and was there anything she could do to help, she was advised to be prepared to undertake CPR - pt subsequently arrested. CPR given and ROSC achieved. Pt now intubated on ITU."*

There is much about this story that is troubling, yet it is easy to see how the situation evolved. Dealing with acute airway emergencies such as this away from the tertiary centre can be very challenging and can stretch staff and systems that are not used to it. Senior medical and nursing staff should be directly involved in such cases. The clinical situation can evolve quickly and can easily become overwhelming. Experience and extra pairs of hands always help.

Case 2: *"Patient presented with gross lower facial and neck swelling - Presented as a 'blue call' to ED resus. Initial impression felt to be Ludwig's angina. IV Abx and fluids were given. Initial lactic acidosis was noted, however, patient was clinically not shocked. Patient was stable from an airway and respiratory point of view. Discussion with max-facs consultant overnight - Advice for CT scan of the head and neck as well as review of the airway in case this needed securing. Discussed with night ITU SpR, and agreed that as patient was stable no need for review, but did take the details. CT scan for head and neck with contrast protocolled by teleradiology service querying Ludwig's angina after discussion with max-facs and ITU and form dropped off to CT. Radiographer aware patient was a resus patient with facial and neck swelling, but stated they would call resus to bring the patient.*

After 1 hour, no call had been received and CT stated there was a high volume of patients in CT from other areas in ED. Agreed to bring patient with doctor escort (myself). Arrived in CT, and patient was stable. CT radiographer wanted to confirm exactly what scan to perform so long delay getting through to teleradiology service while patient was in CT corridor. Patient was generally sleeping with no respiratory distress or oxygen requirement. Scan performed… Patient noted to now have some soft stridor following the CT scan. Patient brought back to resus, and ITU bleeped to inform them of the stridor and requested review in resus. Adrenaline nebs and dexamethasone given. Stridor progressively worsened, becoming more harsh in nature. ITU bleeped again as still had not come to ED. Resus ED team began to prepare for intubation, difficult airway trolley moved towards patient, anaesthetic and muscle relaxant drugs brought to patient's bed space. I began to set up for an arterial line to aid intubation. Patient was reporting some difficulty in breathing, but was able to still talk to me. Patient was sat up at 90 degrees with an ongoing adrenaline nebuliser, saturating 92-94%, but was tachypnoeic. ITU SpR arrived in resus, agreed this patient needed intubation and bleeped Anaesthetic SpR. Phone call from anaesthetic SpR answered by myself, and explained that there was a patient I thought had Ludwig's angina that we were preparing to intubate and asked them to come down. Agreed to come to Resus, and we asked them to contact the ODP/anaesthetic nurse so they could both help us. On returning to the patient's bed space, some attempt to pre-oxygenate the patient with Water's circuit was made, but the patient started to become more agitated upright in the 45 degree position. ITU SpR asked us to get rocuronium, propofol and midazolam (rocuronium vial was already on the drugs trolley unopened). The ITU SpR asked for a Mac 4 laryngoscope and bougie at this point. (I assumed to prepare for intubation). The patient was then laid flat (while awake and moving his head from side to side) by the ITU SpR, and while flat was asked to open his mouth. Laryngoscope inserted into mouth, and patient started coughing. I challenged the ITU SpR about this and he stated he was simply having a look, and shouted to give drugs (we assumed he meant anaesthetic agents and muscle relaxants, but no doses were specified). These drugs had not been drawn up. The current monitoring on the patient at this point were saturations, 3 lead ECG and non-invasive blood pressure, and the patient was not at this time being pre-oxygenated. The members of the team present in the cubicle were the ITU SpR, 2-3 resus ED nurses and myself. There was no mention of an intubation plan either, and roles had not been allocated. There was definitely no mention of an airway assistant. While I was drawing up propofol and rocuronium, I turned around to see the ITU SpR inserting the laryngoscope in the patient's mouth - when challenged again, he asked had the drugs…"

The report is truncated at this point by the text limits of the reporting system, but it is recorded elsewhere that the patient died. What has been recorded has some alarming features. There were clearly some communication issues and lack of planning in an out of theatre environment. This is a rare condition and recognition and response is always a challenge. However, there are some basics to be adhered to such as basic minimum monitoring, adequate preparation of drugs and equipment, and adherence to recognised airway management protocols.

Case 3: *"Pt critically unwell in resus requiring intubation. Anaesthetics doctor attended. Intubation attempted without optimisation of patient (SBP 63 at time of first attempt), without monitoring in place; initial 2 attempts with no sats for several mins due to poor perfusion whilst being trouble shot, No ETCO2 for approx 4-5 mins despite raising the concern and asking if they would like it to be put into the circuit. Multiple intubations attempts (5 in total) first 3 with limited planning (no suction available, no pre-oxygenation, no Mapleson-c or BVM or oxygen on patient), multiple different items requested in haphazard manner requiring multiple runners. ED requested ICU to assist during 3rd attempt, igel inserted with EtCO2 (no trace noted and challenged by ICU and ED) Planned VL by ICU and on 2nd VL look airway secured."*

It is hoped and expected that the submission of this organisational report will have led to a robust examination of the facts with a suitable response.

Intubation in the emergency department is often a high stakes procedure, often in an unfamiliar location with unfamiliar staff. It is vital that only sufficiently experienced and appropriately trained anaesthetic staff undertake this procedure. It is a situation where it is hard to defend the failure to use a cognitive aid and/or checklist. The Royal College of Emergency Medicine advocates for the use of the rapid sequence induction checklist of the Royal College of Anaesthetists and Faculty of Intensive Care Medicine (FICM) [1] although there is now a more recent version from FICM and the Intensive Care Society.[2] Individual organisations should adopt a version that suits their exact set up.

All of these cases illustrate issues around speaking up during critical incidents. There is room for all clinicians to learn about using specific communication tools for graded assertiveness (PACE or CUSS for example). One side is about learning to be assertive, but the counterpoint is about learning to hear and receive the view of the other person. Finally, it is important for organisations and individuals to create a culture where staff feel able to speak up.

References

1. Rapid Sequence Inductions in the Emergency Department. *Royal College of Emergency Medicine*, 2021.
2. Intubation Safety Checklist. Intensive Care Society, 2022.

LEARNING POINTS FROM REPORTED INCIDENTS

Referral to ICU of ED patient in extremis

"Patient presented with sudden onset severe breathlessness, severe type 1 respiratory failure despite 15L Non-rebreather mask. likely cardiogenic in nature. Patient was tiring, respiratory rate 45+, tripoding, HR 130, BP 110/70. Called ITU SpR on Call to refer for NIV/review. States as patient only had 1 dose of furosemide, they would not come and see the patient as would only document this and not give NIV. I explained again that my concern the patient was tiring and on maximal oxygen therapy in resus. Again, refused to come and see the patient stating they had spoken to their consultant who agreed with their plan and to refer to medical SpR, who can see the patient and refer back if needed. Escalated to ED Consultant in charge who advised to speak to medical SpR. Medical SpR in resus at the time, details given and referral accepted. [Later, but timescale not indicated]… Call placed in ED for me to come to resus to see the patient. On arrival patient was unresponsive, agonal breathing. Cardiac arrest was confirmed, buzzer pulled, compressions started and 2222 call placed. Thrombolysis given in ED but after protracted CPR attempt patient died."

It is hard to comment specifically on this case as we know nothing about the workloads and availability of the various clinicians at the time, and perhaps it is better just to let the story do the work. One thing that stands out is the 'refusal' to see a patient who is by the description in extremis; one might argue it is better to at least lay eyes on a patient like this – they cannot be assessed over the telephone and sometimes the reality might prompt a more conciliatory reaction. A structured communication tool can help make clearer the severity (or otherwise) of a patient's condition. There is a role for medical emergency teams or rapid response teams, with clear lines of communication (for instance a deteriorating patient bleep).

Deterioration of a patient in a private hospital

"Underwent an elective revision total knee replacement in [private] hospital. Extensive co-morbidity including diabetes, ischaemic heart disease and chronic kidney disease. Arrived from Pakistan the night before surgery, therefore may not have been through usual pre-assessment process. Sustained a large myocardial infarct post operatively and admitted to intensive care unit at [local NHS hospital] in cardiogenic shock. Underwent coronary angiography. Developed multi organ failure and died from ventricular fibrillation (VF) arrest [nine days later]."

The NHS unit had had no involvement with the patient prior to their deterioration. They made the comment that the root cause analysis was being performed by the private hospital and "we await sharing of learning."

As hinted at by the reporter, the patient cannot have been pre-assessed to the same standard as if had they been in this country before admission. How this came to pass will be of concern to the private organisation, surgeon and anaesthetist in equal measure.

Missed advance decision

"NITU patient 4 days post extubation for empyema washout, increasing oxygen requirement for last 2 days with deteriorating GCS, being treated for chest infection. Acute further deterioration post CT head scan with desaturation to 80% on 100% O2 - intubated. Family updated. Paper notes had been in disarray with only notes from most recent 2 days clipped in folder, rest loose and out of order. On sorting notes the following morning, found documentation of decision not for intubation in event of further deterioration from 6 days previous, due to poor prognosis from underlying muscle weakness. This had been discussed with the family. This had not been documented on the ICU admission or ICU handover sheet and verbal handover between juniors the day prior was that the patient was for respiratory and cardiac escalation."

This story highlights the absolute and inviolable need for careful and professional maintenance of patients' clinical notes. The clinician's responsibility is enshrined in the GMC's Good Medical Practice [1] but organisations also have a responsibility to ensure the healthcare record is preserved in good order. As highlighted in this story, escalation decisions in particular need to be clearly documented in a standardised way that is easily accessible. In this story, the failure to discover an apparent advance decision is a serious matter. It led to a patient being subjected to a treatment which had previously been decided against. Depending on the nature of this decision, failure to adhere to it could be viewed as unlawful or negligent and so could have had significant professional and legal ramifications for the individuals and organisation.

Reference

1. Good Medical Practice. GMC, 2013.

LEARNING POINTS FROM REPORTED INCIDENTS

Missed dislocation of shoulders

"Patient was admitted to ITU after an epileptic seizure. Patient states on regaining consciousness had bilateral shoulder pain. Patient says they and their mother mentioned this repeatedly to staff (nursing staff and doctors) about shoulder pain and concerns, and was repeatedly reassured. Chest x-ray showing bilateral shoulder dislocation. Injury was missed. Injury only picked up by MRI 6 months later by which time severe damage to left shoulder. Affected patient's study and work. Patient will now require complex surgery and will likely suffer long term disability."

The cause of unexpected or unexplained pain should always be sought. It's not clear exactly when the chest X-ray was taken, nor if and when it was formally reported. Although this case came to light in ICU, it could plausibly have come to light in post-anaesthesia recovery for instance and thus is a valuable lesson for us all.

Anaesthesia for hip fracture surgery

"Patient had cemented hemiarthroplasty of left hip under spinal anaesthetic… Patient's surgery was delayed initially as unstable with fast AF and hypotension. This was an appropriate delay and decreased risk but although patient then had a straight forward anaesthetic and surgery, they had a cardiac arrest at the end of the procedure. Their output returned following resuscitation but following discussion with the family, it was decided to withdraw treatment in view of advanced age and patient's wishes. There was full discussion with the relatives who were able to see the patient before they died even though in theatre, demonstrating excellent end of life care. Post mortem revealed a fat embolus which is a rare but known complication of fractures femur and could not have been avoided."

As so often seen in this publication, a reminder of the frailty of patients that present for this type of surgery

Non-availability of equipment

"… inadvertent pneumothorax during laparoscopic surgery, chest xray confirmed, requested chest drain and bottle kit, none to be found in hospital. We are the only theatre department in the trust who keep these drains… theatres ordered on top up yesterday on the back of this incident, maybe the other sites need to consider ordering in case of this rare emergency. We managed to get one sent from [a surgical ward]. As a rule we keep these for the thoracoscopy lists which had use our remaining stock the previous week. The store people had not placed an ordered for replacement stock. This has now been rectified. Store people are now aware to have this available or highlight to manager or coordinator when emergency kit is unavailable."

Dialogue between clinicians and those staff responsible for procurement and stocking is vital. Changes to stock levels or to the specific items stocked should never be implemented without involvement of clinicians. Organisations should have a nominated clinician with responsibility for this, with whom procurement and store room staff should liaise.[1] We repeatedly hear stories that suggest this relationship is not always thoroughly embedded in all organisations.

Reference

1. Chapter 2: Guidelines for the Provision of Anaesthesia Services for the Perioperative Care of Elective and Urgent Care Patients 2023. Guidelines for the Provision of Anaesthetic Services, Recommendation 7.9.

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Correct as at January 2024