SAFE ANAESTHESIA LIAISON GROUP

PATIENT SAFETY UPDATE

1 April 2021 – 30 June 2021

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LEARNING POINTS FROM REPORTED INCIDENTS

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This document aims to achieve the following:

- Outline the data received, the severity of reported patient harm and the timing and source of reports
- Provide feedback to reporters and encourage further reports
- Provide vignettes for clinicians to use to support learning in their own Trusts and Boards
- Provide expert comments on reported issues
- Encourage staff to contact SALG in order to share their own learning on any of the incidents mentioned below.

The SALG Patient Safety Updates contain important learning from incidents reported to the National Reporting and Learning System (NRLS). The Royal College of Anaesthetists (RCoA) and the Association of Anaesthetists would like to bring these Safety Updates to the attention of as many anaesthetists and their teams as possible. We would like to encourage you to add this update to the agenda of your next morbidity and mortality meeting and we would also like to hear your feedback on learning points.

Feedback from M&M meetings on how the Patient Safety Update has informed action can be sent to the SALG administrator at admin@salg.ac.uk

Tracheostomy 1

"The patient had a tracheostomy inserted the morning of the event. The patient tracheostomy tube dislodged at time of event. Anaesthetists were unable to ventilate through the tracheostomy and the patient oxygen saturations dropped. The patient was intubated through the mouth but still unable to ventilate - finger exploration through the tracheostomy site found the ET tube to be outside the trachea and in the mediastinum. Patient was re-intubated successfully. During this the patient lost cardiac output. Patient was given CPR and 0.2mg adrenaline. Patient gained ROSC after 1 cycle of CPR. Post cardiac arrest chest x ray showed left sided pneumothorax and pneumomediastinum. The reason for this procedure was because the patient was assessed and required an adjustable tracheostomy which was agreed by ENT surgeon, and was inserted. This unfortunately was removed before returning back to ICU due to not being able to insert the inner cannula, and an ordinary Portex tracheostomy was inserted instead which was clearly too small and caused the tracheostomy to dislodge. The ENT surgeon was informed of this incident, and another date made for re insertion of an adjustable tracheostomy tube by the same ENT surgeon. 3 sizes sent to theatre to ensure the correct tube size was inserted. When any tracheostomy is requested and is a surgical procedure in theatre, we must ensure that there are different size tubes sent with the patient and the ENT surgeon is familiar with the tubes we ask him to insert. Portex Bivona adjustable tracheostomy size 8mm non-fenestrated was sent with the patient to theatre. This tracheostomy was inserted successfully, but unfortunately, the ENT surgeon could not put in the inner cannula correctly, and therefore decided the whole tracheostomy should be removed as we normally have an inner cannula with all tracheostomies in ICU. The decision was made by ENT Dr to insert a standard size 8.0 mm Portex tracheostomy with inner cannula and was happy it was in place before being transferred back to ICU. After just a couple of hours the patient was not ventilating adequately and the ICU team were unable to ventilate through the tracheostomy and therefore resorted to orally re intubating the patient. Unfortunately, when orally re-intubating the patient, the ET tube was found to be outside the trachea and in the mediastinum. Another attempt was made to orally intubate and was then successful, however the patient sustained a cardiac arrest due to hypoxia."

A false passage can occur at formation of a tracheostomy or if a (normally rigid) tracheostomy tube is subject to being pulled back and then reinserts incorrectly. This causes an immediate and potentially fatal complication. Reverting to endotracheal intubation with any delay in correction is correct but unfortunately and unusually this passed through the stoma into the false passage possibly worsening it. The tracheostomy was replaced and inspected in theatre, but unfortunately the inner cannulae of adjustable flange tubes are more prone to difficulties of insertion and this was the case so a standard tube was the best that could be achieved. The recurrence of the problem was a high risk.

When reintubating orally after surgical tracheostomy there is a risk that the tracheal tube passes out through stoma. This can be prevented by having an assistant place their finger over the tracheal stoma to guide tube in correct direction. There is much less risk after percutaneous tracheostomy as the stoma is smaller.

This case highlights the importance of putting in a tracheostomy of adequate length. This was also a key lesson of the NCEPOD report *Tracheostomy care: on the right trach?*[1] The most common factor in tracheostomy displacement is too short a tube. It would have been better to put in an adjustable flange tube without an inner cannula rather than a too short tube with an inner cannula. Bronchoscopy is the definitive method to ensure correct length with satisfactory position in trachea and should be undertaken for both percutaneous and surgical tracheostomy.

This case is a reminder of the importance of diligent securing of the tracheostomy tube and preventing pull on the tubing at all times. Properly adjusted neck tapes are critical in preventing tube movement. High risk times for displacement in ventilated patients are during patient turns and someone should be responsible for controlling the tube.

Tracheostomy 2 – adjustable flange

This case relates to a patient with BMI 50 with COVID-19 pneumonitis: *"Surgical tracheostomy for respiratory weaning purposes. Size 9 variable length tracheostomy tube (Portex Uniperc) sited. Secured with 95mm marking at skin. Post-procedure flexible scope showed carina seen. CXR post-procedure reported as "There is a tracheostomy tube in situ with its tip projected over the carina and needs to be withdrawn." ICU Consultant withdrew tracheostomy tube by only 1 cm and it came out. Neuromuscular blockade had worn off and so patient was able to breathe spontaneously, maintaining oxygenation. Flexible scope performed, unable to see trachea. Tracheostomy safely reinserted by ENT surgeons (sutures released and tube passed back in). Secured 120mm at skin. Chest x-ray reviewed. What was reported as being past the carina was in fact the tracheostomy tube outside the trachea and patient. Tube did not follow course of right main bronchus and bisected the carina…. Radiology feedback was that "the eye sees what it wants / expects to see, patient in front of you is primary". ENT recommendation that when pulling back tracheostomy tubes this is done under direct vision using scope. Check the image yourself to confirm the report if doing a practical procedure yourself."*

Image: Portex Uniperc adjustable flange tracheostomy tube

Variable length or adjustable flange tracheostomy tubes are, as the name describes, adjustable to suit a variety of clinical circumstances. When the tube is adjusted to have a long portion inside, there is a short portion outside and vice versa. If the outside portion of tube is long, and particularly if the tube is flexible as in the Uniperc design, it can hang downwards and on chest X-ray, it can overlay the trachea. To the casual inspection, this can be interpreted as an over-long tracheal portion of tube, when in fact the intra-tracheal portion may be perfectly adjusted or short. That appears to be what happened in this case. The *Patient Safety Update* editor has also seen this same error made, with a fatal outcome.

Correct tracheostomy tube position should be confirmed by bronchoscopy and not CXR. This should include distance from carina which does not appear to have been recorded in this case. FICM guidance on tracheostomy is that: "*The position and orientation of the tracheostomy tube must be checked and documented, with the patient in the position that they will be nursed in (rather than the insertion position). This should include the distance from the carina, which is especially important for adjustable flanged tubes*" and that chest X-ray is usually not necessary.[2] In this circumstance, one has to question whether it is the place of the radiology report to recommend withdrawal. Clinicians should not withdraw tracheal tubes on the basis of chest X-ray alone. In this case, if position had been confirmed as per guidance and the length documented, this could have alerted the clinicians to the error. Likewise, if the clinicians had carefully assessed the X-ray in the context of this less common type of tracheostomy tube, they may have spotted the confounding error. A LocSSIP should include provisions to ensure assessment of position and insertion depth have been carefully and unmistakeably documented (as seen in the B@EASE checklist.[3] Making changes to an adjustable flange tracheostomy tube should always be preceded by some serious reflection. Withdrawing it under direct bronchoscopic control (through an appropriate swivel connector) would offer the greatest degree of reassurance, whilst also acting as an introducer to railroad the tube back in if necessary.

1. NCEPOD (2014) Tracheostomy Care: On the Right Trach? Available: (ncepod.org.uk/2014tc.html).
2. National Tracheostomy Safety Project; Faculty of Intensive Care Medicine; Intensive Care Society (2020). Guidance for Tracheostomy Care. Available: (https://www.ics.ac.uk/Society/Guidance/PDFs/Tracheostomy_care_guidance).
3. National Tracheostomy Safety Project. NTSP Resources. Available: (tracheostomy.org.uk/resources/documents).

LEARNING POINTS FROM REPORTED INCIDENTS

Foreign object debris and airway obstruction risk

There was a report regarding a particular type of processed EEG monitor electrodes: "*These are 'ECG' type electrodes used in anaesthetic practice i.e. where patients are intubated. The backing of this product is completely transparent. I understood that this type of backing posed a risk of airway obstruction and there was now a requirement that plastics of this type were either coloured or marked with a contrasting pattern. All stock has been removed from use and quarantined*".

The reporter cited the recent national alert *Foreign body aspiration during intubation, advanced airway management or ventilation*.[1] This report is a useful reminder of the risk posed by foreign object debris which abounds in clinical practice and that the potential hazard is not just from ECG electrode backings. This is an opportunity for clinicians to ensure their organisation has complied with the alert. It is interesting to note the alert also addressed the need for breathing circuit components to be protected from foreign object ingress when ends are open. This clearly refers to items related to the current or next case, but units may wish also to review practices around storage of open, but unused breathing circuit components not in immediate use, such as circle system tubing, reservoir bags and airway devices. These are often left hanging, in drawers or on work surfaces without protection.

1. NHS Improvement (2020) Foreign body aspiration during intubation, advanced airway management or ventilation. Available: wwwmedia.supplychain.nhs.uk/media/National-Patient-Safety-Alert-4-September-2020.pdf

Complication of arterial puncture

Case 1: *"Attempted femoral art line/PICCO insertion, which led to haematoma, and continued to bleed, needing vascular surgical operation, including transfer to nearest vascular centre."*

Case 2: *"Patient with acute sub-arachnoid haemorrhage [day 1]. Intracranial aneurysm diagnosed [early hours, day 2]. Intubated and ventilated for EVD. Kept anaesthetised. Aneurysm coil embolization (2 aneurysm) left ICA on [day 2, afternoon, 11.5 hours after aneurysm diagnosis]. No access issue to right common femoral artery. 6Fr sheath inserted. Uncomplicated procedure. 6Fr Angioseal device to close arteriotomy. No concerns raised overnight ?limb observations. Possible note of cold limb at [late morning, day 3]. ?Patient had sedation hold and making indications of limb pain."*

And, another report of the same incident:

"I was called regarding an acutely ischaemic leg of the above patient by the neurosurgical team... The patient had been admitted with subarachnoid haemorrhage 2 days earlier and had a stent in situ, 24 hours earlier had coiling of intracranial aneurysm via right CFA. I asked the team if the patient could be safely transferred to [another centre] for the vascular procedure and could have heparin. A few minutes later the neurosurgical SHO said yes to heparin, but no to transfer to [the other centre]. I asked that arrangements made for immediate transfer to theatre for surgery and to get vascular equipment across from [the other centre] and arrange an assistant. I saw the patient… intubated and ventilated so unable to assess leg fully, but obviously ischaemic with absent pulses. Taken immediately to theatre. Initially attempted salvage, but became clearer the safest option is above knee amputation; so performed"

Vascular injury and impairment of circulation is a known complication to observe for and a surgical emergency to treat. This report raises issues about team work and communication in and between teams to get appropriately skilled intervention. These decisions should be at a senior level.

Blood glucose management error

"Pt was receiving actrapid infusion 5 iu/hr from the day shift and not monitored the blood sugar until 5 am and at 5 it was 0.2 mmol/L. Was looked after by a support nurse from PICU. Pt was not started the feed because the NG confirmation by CXR was after midnight."

In this case, it seems correct advice about not using an unverified NG tube was followed, which is reassuring. But, the failure to monitor glucose is impossible to defend. Whenever an insulin infusion is used there must be a continuous source of sugar either as IV dextrose or NG feed. It is not stated whether this was an adult or child patient, or whether the PICU support nurse was seconded during the pandemic, but this may have been a factor. The hospital was undertaking a serious incident review.

Blood transfusions

Case 1: *"20 minutes after platelet transfusion commenced, a suspected transfusion reaction occurred. Blood Pressure started at 130/70 and dropped to 60/40. Exhibited facial oedema, urticaria/itching, dyspnoea (intubated), basal creps and shock. Patient was intubated and ventilated - acute deterioration (bronchospasm). Hypotension and urticarial rash (widespread)."*

Case 2: "Redo AVR upon transfer to bed at the end of surgery developed profound hypotension and a global rash treated with adrenaline and standard ?anaphylaxis protocol with stability gained… over the course of the night developed

refractory RV failure and died the following morning. Cardiac surgeons have conducted a mortality review of the case... Anaphylaxis is one of the potential causes of death, however there is no definitive link to RV dysfunction. No new medications were administered in the 30 minutes prior to the reaction, however, she was receiving a blood transfusion at the time. Her presentation of rash and hypotension is highly suspicious for anaphylaxis. Standard treatment for anaphylaxis was administered and appropriate investigations were conducted (tryptase level within normal range, 9) Following resolution of the clinical signs of potential anaphylaxis, the patient later deteriorated and died in the intensive care unit."

The first case is the sort of scenario that clinicians train for in their mandatory blood transfusion training sessions. The second is more dramatic and it is not clear from the evidence presented why the authors do not give the possible diagnosis of a transfusion reaction primacy. Readers are reminded about SHOT, Serious Hazards of Transfusion, the UK's independent, professionally-led haemovigilance scheme (shotuk.org)

Patient supervision during CPAP

"The patient was asleep in the CPAP hood in a side room, as per infection control policy. The staff nurse looking after them was in the next side room setting up a ventilator for a new admission due on the unit. Whilst getting a drug out of the cupboards a second nurse noted on the central the patient's heart rate had dropped to 33 and the arterial trace have flattened. Immediately went to investigate with the ward sister. On entering the room, the patient was found unresponsive with the sats probe on the floor and the CPAP deflated and disconnected and half removed. HDU patient requiring CPAP Hood was nursed in a side room due to aerosol generating procedure. He had been settled throughout the day and able to use his buzzer to call for assistance. On the night shift he had been settled and sleeping with his designated nurse observing from outside the side room so that he could sleep. She briefly went to assist the preparation of equipment for a new ICU admission and patient was found to be bradycardic with no cardiac output. CPR commenced. Witness statements have been gathered and the incident was discussed at [review panel] and changed to a yellow incident as risk assessed at the time and patient had been stable and settled. The patient was high dependency and therefore requiring 1 nurse to 2 patient care not one to one. Whenever possible to keep 'eyes on' all patients at all times that are CPAP hood dependant but this may not always occur as HDU patients have 1 ICU nurse to 2 patients. Same discussed at ICU Sister meeting."

Monitoring ratio of 1:2 is accepted for Level 2 patients in the UK, but th is is the minimum recommendation and does not take into account managing a patient in a side room. A safe level of staffing is 1:1 for CPAP in a side room. The reality is that multitasking during critical care has been necessary during surges in activity and with staffing deficits. The importance of direct patient observation is highlighted here.

Regurgitation and aspiration

"[Octogenarian] patient on CEPOD list. Large scrotal hernia for repair. No obstructive symptoms. Appropriately starved. Decision made to intubate in view of large hernia. Induction of anaesthesia with propofol, fentanyl, rocuronium. No manual ventilation. On first view of pharynx, large amounts of brown, nonparticulate fluid. Head tipped down, suctioning performed. Airway taken over by consultant anaesthetist who inserted tube quickly, in the presence of continuing regurgitation. Artificial ventilation started with FiO2= 0.6, SpO2 95, peak pressure 32, settling to 26. NG tube inserted, ~200ml fluid aspirated. 15 mins into operation, sudden increase in inflation pressures (40), small tidal volumes (130ml) SpO2 84%, BP decreasing. Anaesthetic emergency call put out. Team arrived promptly. Trachea suctioned blindly, then under direct vision with bronchoscope. Little fluid seen, no particulate matter. Given salbutamol aerosol into circuit and 2 boluses of iv adrenaline 50mcg - substantial improvement. Operation concluded. In view of continuing high oxygen requirements and high ventilation pressures, patient taken to ICU, still ventilated, postoperatively… case discussed at anaesthetic M&M... Anaesthetic care felt to be of a high standard and the aspiration unexpected (patient vigorously denied any symptoms of bowel obstruction). Appropriate protective measures had been implemented prior to induction of anaesthesia. Once the aspiration occurred it was managed appropriately by consultant anaesthetist and intensivists. The aspiration on induction of anaesthesia likely contributed to the patient ultimate death (multi-organ failure), hence I have graded the severity as 'severe', but I do not think that there was any failing in care; unfortunately, this is an extreme example of a recognised complication of anaesthesia which was not preventable."

We assume that the patient's starvation status was accurately assessed, but it is always worth considering the quality of the historian. This article[1] gives a good overview of the issues around starvation and gastric emptying and documents emerging technologies which may become routine over time.

1. El-Boghdadly K, Wojcikiewicz T, Perlas A. Perioperative point-of-care gastric ultrasound. *BJA Education*;19:219-226. Available: bjaed.org/article/S2058-5349(19)30047-2/pdf

LEARNING POINTS FROM REPORTED INCIDENTS

Nasogastric tube

"Misplaced NG tube in lungs not identified on x-ray. Feed commenced causing deterioration of patient's condition. Ng tube placement not documented."

The latest of many and regular reports to PSU of unchecked NG tubes being used and leading to harm. The guidance, as ever, is here:

1. NHS Improvement (2016) Patient safety alert: Nasogastric tube misplacement: continuing risk of death and severe harm: Available: england.nhs.uk/publication/patient-safety-alert-nasogastric-tube-misplacement-continuing-risk-of-death-and-severe-harm.
2. BAPEN; National Nurses Nutrition Group; Faculty of Intensive Care Medicine; Intensive Care Society; Association of Anaesthetists; Royal College of Anaesthetists (2020) Aide Memoir: Nasogastric tube (NGT) placement checks before first use in critical care settings during the COVID-19 response. Available: bapen.org.uk/pdfs/covid-19/aide-memoire-ngt-placement-13-05-20.pdf.

Anaphylaxis

A regular reminder of this complication.

"Given 70 protamine sulphate to reverse heparin on surgeon request. High airway pressures and hypotension noted 2 minutes after injection SpO2 dropped to 85%. Systolic BP in high 50s, not responding to metaraminol boluses. Anaphylaxis to protamine sulphate suspected."

Loss of vision

"Patient had a GA for revision of right knee infected prosthesis and latissimus dorsi free flap. This was a long operation and patient required fluid and blood transfusions intra-operatively, and had facial swelling post-op. Bilateral blurred vision post-op. It was subsequently discovered that she could no longer see from her right eye, with right-sided proptosis. Patient was seen in eye casualty … and has been investigated with a CT … Visual loss is thought to relate to the facial oedema and possible temporary increase of intraocular pressure. According to ophthalmology "likely R posterior ischaemic optic neuropathy secondary to recent surgery/blood transfusions". Left eye vision has returned. Patient will be followed up by ophthalmology locally on discharge. The request for ophthalmology review was made by the bone infection (medical) team who were aware of the post-operative visual changes. After learning about the eye problem from the patient and team I have spoken with the patient and apologised for what has happened."

It is not clear what position the patient was placed in. It is possible prone position was involved during the free flap surgery and this of course brings known and well-documented risks to the eyes. Similarly, the authors have not stated how they secured the tracheal tube. Prolonged surgery with a tight tube tie can cause significant facial swelling from occlusion of the external (and internal) jugular veins. Venous outflow obstruction, and the resulting rise in intraocular pressure, could potentially cause monocular blindness.

In any event, there is no specific monitor for pressure or blood flow in the eye during anaesthesia, but the risk is real, so the message as ever is one of extreme care in patient positioning with regular checks.

Pregnancy tests before anaesthesia

NRLS continues to receive reports of failure to perform a pre-operative pregnancy test in women of childbearing potential undergoing surgery, with the omission being discovered at least after anaesthesia has begun.

NICE already has guidance on this, in relation to elective surgery[1] and it seems that the principles could be applied equally to emergency surgery:

- On the day of surgery, sensitively ask all women of childbearing potential whether there is any possibility they could be pregnant.
- Make sure women who could possibly be pregnant are aware of the risks of the anaesthetic and the procedure to the foetus.
- Document all discussions with women about whether or not to carry out a pregnancy test.
- Carry out a pregnancy test with the woman's consent if there is any doubt about whether she could be pregnant.
- Develop locally agreed protocols for checking pregnancy status before surgery.
- Make sure protocols are documented and audited, and in line with statutory and professional guidance.

There is evidence in the literature that the risk to mother and foetus are not significant[2]: *"… when the risks of maternal hypotension or hypoxia are minimal, or can be adequately mitigated, indicated surgery during any trimester does not appear to subject either the mother or fetus to risks significantly beyond those associated with the disease itself or the complications of surgery in nonpregnant individuals."*

Nonetheless, a fully informed discussion should take place, with a protocol in place where testing is declined. In the light of a positive test, consideration and discussion of risk versus benefit will guide the patient and health care team on whether and when to proceed with surgery.

1. National Institute for Health and Care Excellence (2016) Routine preoperative tests for elective surgery [NG45]. Available: nice.org.uk/guidance/ng45/chapter/Recommendations#pregnancy-tests.
2. Tolcher MC, Fisher WE. MD; Clark SL. *Nonobstetric Surgery During Pregnancy. Obstetrics & Gynecology*;2:395-403 doi: 10.1097/AOG.0000000000002748. Available: pubmed.ncbi.nlm.nih.gov/29995718.

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