



PATIENT SAFETY UPDATE

January–March 2019



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 SALG@rcoa.ac.uk

Accessory common gas outlet

It is apparent from formal and informal reports that the presence of the accessory common gas outlet (ACGO) on anaesthetic machines (that is to say the switchable gas outlet) has been associated with adverse incidents of patient harm and near misses. The Medicines and Healthcare Regulatory Authority (MHRA) receives reports of adverse incidents, no matter how old those incidents are. Cases of harm or near misses relating to equipment should be reported to MHRA, even if historic. This should therefore be done online via the 'medical device adverse incident' button at <https://yellowcard.mhra.gov.uk>. Similar incidents can be reported collectively on one report rather than filling out multiple reports of essentially similar incidents. Any report of adverse incidents relating to the ACGO must include the make and model of the equipment.

Injuries related to dialysis line insertion

In April 2019's Patient Safety Update, we reported on a fatal complication of dialysis line insertion. The patient died of an iatrogenic injury. Dr Dewi Williams at Dumfries & Galloway Royal Infirmary contacted PSU, offering to share a protocol that unit has developed to reduce harm and increase patient safety during dialysis line insertion. A poster describing this work can be downloaded [here](#) and Dr Williams can be contacted via admin@salg.ac.uk

Erroneous central line insertion

A patient with sepsis and fungaemia had a new central line inserted to replace one that had been in use for seven days. A senior and experienced SAS doctor inserted a fresh central line via the right subclavian vein. Insertion was described as uneventful and straightforward, although it is not recorded whether ultrasound guidance was used or what confirmatory tests of placement were applied. The patient became haemodynamically compromised with BP 80/40 and HR 115 min⁻¹. Chest x-ray showed right sided pneumothorax and a chest drain was placed. Repeat chest x-ray showed expanded lung on the right side and drain and central line in correct position. The central line was used overnight and medications were given through it using a volumetric pump. The next day, the attending nurse informed the medical team that a metronidazole infusion which was not being infused via the pump was showing pulsatile backflow. A blood gas from central line showed numbers which accorded with those from the arterial line. The central line pressure trace scale was adjusted and noted the trace was of arterial line.

Sub-clavian lines are associated with more hazards than those placed in the internal jugular vein. It is not clear why the sub-clavian was chosen in this case, but consideration should always be given to another internal jugular line. Complications, when they do occur, are potentially more severe and harder to detect and treat. If cardiovascular collapse occurs associated with after central line insertion, it is vital to have a high suspicion of that being the cause. It is essential to check correct placement of central venous lines. There are a number of tests that can be done at the time of insertion, including before dilation takes place, that can reduce the risk to the patient. These should be standardised in local protocols. Such tests are well covered in the piece of work from Dumfries & Galloway mentioned above; they apply equally to ordinary central lines as to dialysis lines. Arguably the tests performed in this case were done too late.

Potassium infusions

A patient was undergoing a laparotomy for large bowel obstruction. The patient had hypokalaemia. A senior specialty trainee hung a 100 ml infusion bag containing 40 mmol KCl and purposely had it dripping very slowly. The senior trainee left the patient with a first-year anaesthetic trainee. The first-year trainee unintentionally infused potassium too quickly after adjusting the speed of the infusion on the giving set. The patient became bradyarrhythmic for 5-10 minutes but the patient had a pacemaker in place so did not come to any harm. As part of their reflective practice on the incident, the junior trainee devised their own safety system for using potassium infusions.

Potassium-containing solution should be administered using a volumetric pump.^{1,2} In this case, this would in all likelihood have prevented the rapid infusion of potassium. It is open to discussion whether it was the trainee's place to devise a system for future use of potassium solutions; this may have been better addressed with a policy at organisational level or higher.

References

1. United Kingdom Medicines Information. *How should intravenous (IV) potassium chloride be administered in adults?* Specialist Pharmacy Services, 2016 (www.sps.nhs.uk/wp-content/uploads/2014/05/QA186_5potassium_admin.docx).
2. Injectable Medicines Guide (Medusa). *Potassium Chloride* (version 7), 2018 (www.injguide.nhs.uk). Please note: you will require a password to access this document, NHS staff can apply for a password, if you require any help in doing this please contact your local medication safety officer (MSO).

Always read the label

An adult patient was anaesthetised for an elective dental extraction. Anticipating potential difficulties in managing the patient airway (a high BMI and a history of snoring), the anaesthetist placed a vial of suxamethonium in the tray containing the other anaesthetic drugs intended for use. Whilst talking to the patient, the anaesthetist drew up the suxamethonium without reading the label, mistaking it for fentanyl and administered it. The organisation's supplier for suxamethonium had recently been changed to the same supplier as its fentanyl and as a consequence the ampoules were of similar appearance. Fasciculation was noted and the patient became apnoeic and oxygen saturation fell. The anaesthetist rapidly realised the error and bag-mask ventilation with an oral airway corrected the hypoxia. Reassurance was given to the patient and propofol was administered. The period of awake paralysis is estimated to have been less than one minute. The patient subsequently recalled an inability to move their limbs or breath and remembered the insertion of the airway. The patient also

remembered the verbal reassurance offered at the time. The patient showed no signs of distress immediately afterwards, but has since described sleep disturbance and nightmares and has been offered follow-up and psychological support.

By their own admission, the anaesthetist did not read the label, but as this story illustrates, by placing the loose ampoule in the tray, a latent hazard was created that became real. And as this story reinforces, ampoules and boxes from a manufacturer are often similar in design or style and organisations often change suppliers without notice to clinicians. Reading the label is a vital step. The management of the awake paralysis episode was good and followed the recommendations of the recent NAP 5 Handbook of the Royal College of Anaesthetists and the Association of Anaesthetists.¹ Good practice in the handling of drugs is a professional matter and the Royal Pharmaceutical Society has issued guidance on Safe and Secure Handling of Medicines² which contains advice and references relevant to this event.

References

1. Association of Anaesthetists and Royal College of Anaesthetists. *The 'NAP5 Handbook': Concise practice guidance on the prevention and management of accidental awareness during general anaesthesia*, London 2019 (bit.ly/2LLrIP5).
2. Royal Pharmaceutical Society. *Professional guidance on the safe and secure handling of medicines*, London, 2018 (bit.ly/2LKQmiK).

TIVA

A total intravenous anaesthesia (TIVA) giving set was noticed to be leaking at the join between the flexible tubing and the rigid part of the Luer connector at the syringe end. As the syringe was removed from the TCI pump, the tubing separated completely from the Luer connector. Fortunately, this occurred after connection to the patient but before any drug administration. The administration set had been assembled and flushed through without any problem. A MHRA Yellow Card was completed.

This reinforces the need for continuous visibility and regular inspection of the administration set and IV cannula during TIVA. It also reinforces the role of continuous depth of anaesthesia monitoring in drawing attention to drug delivery problems. Both are described in the Association of Anaesthetists and Society for Intravenous Anaesthesia's Safe Practice Of Total Intravenous Anaesthesia TIVA 2018.¹

Reference

1. Association of Anaesthetists, Society for Intravenous Anaesthesia. *Safe practice of total intravenous anaesthesia TIVA 2018*. London, 2018 (<http://bit.ly/34PpFIM>).

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Pre-assessment

A patient, with a history of angina required total knee replacement. Their pre-operative assessment identified a number of issues. The patient reported chest tightness and wheeziness. However, further investigations did not occur because the patient had also reported that walking and exercise were only limited by knee and back problems. The patient had a low haemoglobin level recorded at the pre-operative visit. Surgery was not postponed at this point because there was not a ratified active policy in place that provided pre-operative assessment guidelines of when to postpone surgery. The patient was advised to stop taking their regular dose of aspirin 75 mg seven days before the date of planned surgery in line with organisational policy. The patient's scheduled procedure was cancelled on the day because of lack of time and the patient was discharged home and contacted two days later to re-schedule the appointment for a further five days later. The patient was asked if they had re-started their aspirin and as this had not happened the patient was confirmed to attend for their procedure. This meant that the patient had stopped taking the regular dose of aspirin for a prolonged period of time.

The patient received their first post-operative dose of enoxaparin in the late evening of the day of surgery. They suffered cardiac arrest at around 4.00 am the next morning and possible pulmonary embolism was diagnosed and treated with thrombolysis. They were admitted to critical care but continued to deteriorate and died at 7.30 am.

This case highlights the important role that effective and structured pre-assessment plays in optimising patients' preparedness for surgery. It also demonstrates the value of having defined pathways for specific findings at the pre-assessment clinic and evidence-based protocols for certain drug groups in the peri-operative period. Whilst any causal link between the patient's aspirin prescription and their death are wholly speculative, pre-operative assessment in this case identified a number of issues that should have led to the surgery being postponed whilst further investigations were undertaken. In light of local investigation into this case, changes were made to local practice. Guidance on this can be found in the College's 'GPAS' publications.¹

Reference

1. Guidelines for the Provision of Anaesthesia Services for Preoperative Assessment and Preparation 2019, RCoA London. (www.rcoa.ac.uk/system/files/GPAS-2019-02-PREOP.pdf).

Hip fracture frailty

Three more cases were reported on this theme, which regularly recurs in this publication.

Case 1: An elderly patient was listed for cemented hip hemiarthroplasty, with a background of dementia, atrial fibrillation, hypothyroidism, osteoporosis and breast cancer. General anaesthetic was performed, supplemented with nerve blocks. After cement introduction and reduction of the hip, her blood pressure dropped, with reduction in measured ETCO₂ and help was summoned. There was a 'do not attempt resuscitation (DNAR) order and treatment was limited to adrenaline boluses, but with no effect. There was multidisciplinary agreement to stop treatment. Whilst the clinical treatment and decision making were supported in a local incident review, the team were able to learn other lessons around gaining family contact details and around informing next of kin about imminent surgery in this patient group.

This story provides our now regular reminder that appears in this publication that this group of patients is frail and at high risk of complications. The presence of a DNAR order is common in this group and clinicians would do well to acquaint themselves with the law and guidance around this. The Resuscitation Council's Recommended Summary Plan for Emergency Care and Treatment (ReSPECT) provides good guidance.¹ The Association of Anaesthetists has convened a working party to update its own guidance on DNAR orders specifically in the perioperative period and this will be issued next year.

Case 2: A patient with fractured neck of femur was admitted via the emergency department to the orthopaedic ward where they were clerked by the on-call team and listed for theatre. They were assessed by an anaesthetist before surgery. After their operation they became unwell and during treatment it was noted that no chest x-ray had been taken of the patient, despite it being a core requirement of their admission protocol.

This story stresses the importance, where the trouble has been taken to create a protocol, of following it.

Case 3: A patient underwent general anaesthetic for hemiarthroplasty for fractured neck of femur. Just after cement was introduced, the patient suffered cardiovascular collapse.

This is a reminder about the need to guard against bone cement implantation syndrome, a regular and recurring theme in this publication.²

References

1. Resuscitation Council. Recommended summary plan for emergency care and treatment (ReSPECT). (www.resus.org.uk/respect).
2. Association of Anaesthetists. Reducing the risk from cemented hemiarthroplasty for hip fracture. London, 2015 (bit.ly/34173DW).

Aspiration risk

An elderly patient was scheduled for manipulation under anaesthesia of a fractured ankle. They were fasted overnight. They had a history of atrial fibrillation, alcohol excess with alcoholic fatty liver, chronic kidney disease stage 3, hypertension, asthma and gastritis for which they took lansoprazole. Upon induction of anaesthesia, a coffee ground fluid was seen welling in the patient's mouth before bag-mask ventilation as a part of securing of her airway. The patient did not survive her hospital stay although it is not stated whether the regurgitation played any part in this.

A lesson here is that some patients do not have an empty stomach despite "adequate" starvation time, as reported previously in PSU. There were risk factors here that might have influenced induction and airway management techniques to reduce regurgitation and aspiration risk, in particular: alcohol excess, chronic kidney disease, gastritis and bony trauma.

Sudden absence of monitored vital signs

Intravenous induction took place with an arterial line and 16g cannula already in situ because the patient had previously had a procedure abandoned because of refractory hypotension at induction. Cardiac investigations were all normal. Parameters were all satisfactory and remained so on transfer to theatre. Amikacin and methyl prednisolone were given and no more than 30 seconds later, the oximetry plethysmograph and IABP trace became flat (as though disconnected) and the gas leak alarm on ventilator sounded with flat expired CO₂ trace. A pulse (it is not specified which) was 70-80 min⁻¹ and regular. Fresh gas flow was increased and with ventilation of the lungs, oxygen saturation improved but with high inflation pressures. The IABP waveform reappeared slowly showing systolic pressure of 35 mmHg and CPR was started. The outcome was not reported.

The cause of the patient's cardiovascular collapse is not clear. However, all clinicians should learn and recognise that the triad of suddenly absent or diminished oximeter plethysmograph, blood pressure (NIBP or IABP) and expired CO₂ signifies low/no cardiac output until proven otherwise.

Prone position

A patient was scheduled to undergo elective surgery to the Achilles tendon in the prone position. The CEPOD list consultant anaesthetist helped start the case and position the patient in theatre. Initially all was uneventful and they left, but were called back urgently within a few minutes. The list anaesthetist was hand ventilating the patient's lungs because of high airway pressures and they had given some more neuromuscular blocking drug. Sinus rhythm on the ECG changed to an unspecified abnormal rhythm. A decision was taken to transfer the patient onto their back at which point they were noted to be in a broad complex regular tachycardia at a rate of 200 min⁻¹. A pulse check once in the supine position confirmed pulseless electrical activity and CPR was started. The cardiac arrest team attended and treatment continued. Return of spontaneous circulation (ROSC) occurred after 1mg adrenaline, however there was no pulse on the next recheck. A further 1 mg adrenaline was given and ROSC occurred again, but was lost by the next recheck. Despite further CPR and adrenaline, there was no further ROSC. No cause of death was known at the time of the report.

This case reminds us of one of the hazards of the prone position, namely management of cardiac arrest. It is vital that the attending team have a plan and the necessary personnel and equipment to hand to turn a patient supine as rapidly as possible.

Drug error

A patient underwent partial gastrectomy with invasive arterial pressure monitoring and a central venous catheter (CVC). Total intravenous anaesthesia (TIVA) was used. The TIVA line was disconnected from the CVC and a syringe containing clear colourless liquid was used to flush the line with approximately 6-8 ml injected. A sharp rise in blood pressure was noted and the syringe was noted to be labelled 'metaraminol'. With an indicated blood pressure of 191/114 and heart rate of 80 min⁻¹, 100mg propofol was given followed by 200 mcg glycopyrrolate to counteract bradycardia secondary to metaraminol. Following this, metoprolol was sent for from another location and 2 mg was given. Blood pressure and heart rate normalised and the patient was transferred to the critical care unit. The patient was slow to wake up and a CT scan of the head showed a large left basal ganglion bleed with clinically a right sided hemiparesis.

Once again, we are reminded of the need to read the label when reaching for a syringe. Humans are fallible and there is a finite error rate. Mathematical modelling suggests a drug

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error will occur in around 10% of operations of 12 hours duration.¹ Improvements to and standardisation of drug presentation may have a part to play in reducing these errors.

NAP5 found 17 instances of syringe swaps and drug errors. Although their focus was instances of accidental awareness under general anaesthesia, the report's recommendations (which includes system changes) are equally applicable to this circumstance and are recommended reading.²

There are also lessons around pharmacology. Reversal of alpha-agonist mediated hypertension can be reversed using an alpha-blocker. One may not always be readily to hand in all clinical areas, so other agents may be needed for a more immediate solution. The use of glycopyrrolate in this case is worthy of attention. Bradycardia is a normal feature associated with the hypertension seen after metaraminol administration and does not usually need any treatment. In fact, giving glycopyrrolate may worsen and prolong the hypertension by adding tachycardia to systemic vasoconstriction. The bradycardia caused by metaraminol subsides as the metaraminol effect wears off.

1. Sivia DS, Pandit JJ. Mathematical model of the risk of drug error during anaesthesia: the influence of drug choices, injection routes, operation duration and fatigue. *Anaesthesia* 2019;74:992-1000. doi: 10.1111/anae.14629. Epub 2019 Mar 18.
2. Mackay J, O'Connor K, Cook T. Drug errors and awake paralysis. In Pandit JJ, Cook TM, The NAP5 Steering Panel. *NAP5. Accidental Awareness During General Anaesthesia*. The Royal College of Anaesthetists and Association of Anaesthetists of Great Britain and Ireland. London, 2014. (bit.ly/2kwv4Mk).

Equipment knowledge

An urgent call for help was put out 1:30am on intensive care as an infusion pump delivering noradrenaline to a patient had reverted to 'keep vein open' (KVO) mode rate. This is a mode where the infusion pump reverts to a fixed, minimal flow rate when the syringe is nearly empty, to prevent the cannula from 'clotting off'. The patient's blood pressure fell significantly, leading to cardiac arrest. Treatment started immediately, but 'down time' of approximately six minutes was reported, as a new noradrenaline infusion was drawn up. The patient remained significantly hypoxic after cardiac arrest despite increased ventilator settings and FiO2 of 1.0. This was reported to be very slow to resolve and the patient's fate was not stated. The pump was tested and was found to be working to specification. The pump's event log showed that the KVO alarm had been muted around 15 minutes before the arrest. It appears that the user tried to set a new rate, but this was not allowed by the pump in KVO mode.

There is a tendency to think that skills learned on one piece of equipment are transferrable to another and that the use of medical equipment is possible using prior knowledge and intuition. Increasingly, this is not the case as equipment becomes ever more complex and as manufacturers introduce specific and unique features. Individuals should only ever use equipment that their training has equipped them to use, where necessary with type-specific training. This is also enshrined in the College's Anaesthesia Clinical Services Accreditation (ACSA); standard 2.1.2.2 states: "All anaesthetists and anaesthetic assistants receive systematic training in the use of new medical equipment and the training is documented". There is an individual responsibility to ask for this training and an organisational responsibility to provide it.

Reference

1. ACSA, RCoA (www.rcoa.ac.uk/acsa).

INCIDENT DATA SUMMARY

January–March 2019

Please note: The graphs may not contain all relevant incidents submitted to the NRLS for the given time period due to reporting lag and NRLS processing time. The NRLS team are currently working to modify the SALG data extract to better account for reporting lag and processing time.

Figure 1 – Degree of Harm (actual incidents)

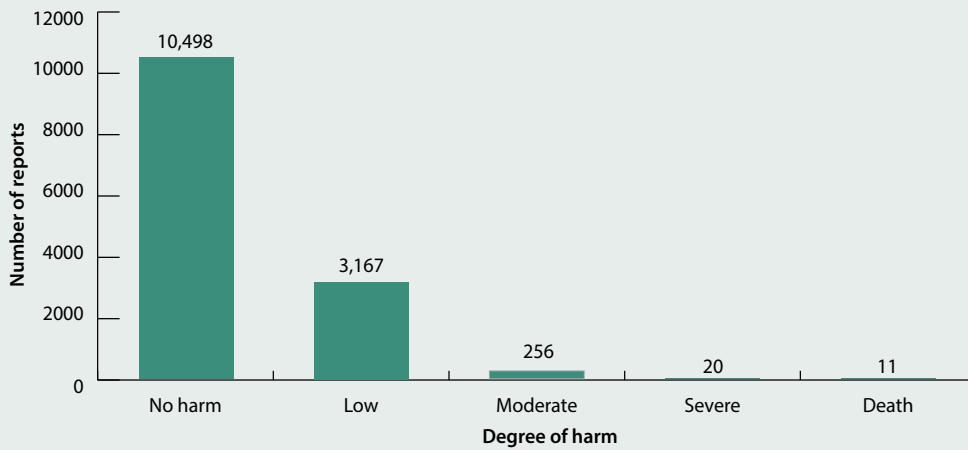


Figure 1 shows the degree of harm incurred by patients within the anaesthetic specialty during the period January–March 2019. 11 deaths were reported though LRMS and none via the anaesthetic eForm.

Figure 2 – Incidents by incident type

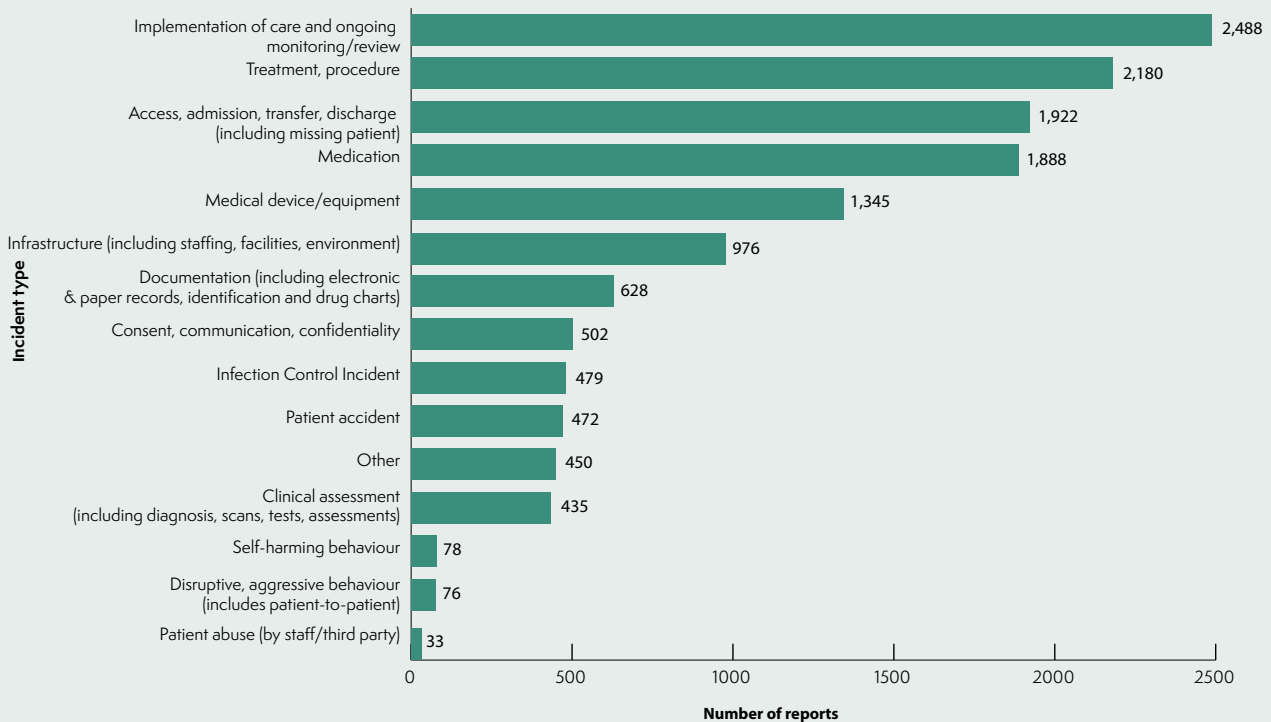


Figure 2 shows the type of incidents that occurred within the anaesthetic specialty that were reported using LRMS or the anaesthetic eForm for the period January–March 2019. The categories were determined at local level.

