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 of Great Britain and Ireland (AAGBI) 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.

FROM THE CORONER

Invasive arterial lines are a routine part of anaesthesia and critical care practice, used for monitoring patient condition and sampling arterial blood for analysis. A recent inquest has identified the arterial flush system as the source of air in a case of fatal air embolism. The expert witness involved raised concerns about the consistency of priming of arterial lines; some centres part-fill the drip chamber in order to see when the line is flushing whilst others fill the chamber completely by inverting the line when preparing the line for use. The exact mechanism of causality is not known. There are no reports of similar cases made to the MHRA to date.

MISCONNECTIONS – TWO REPORTS RECEIVED BY SALG

SALG has received a report of the potential for misconnection of the new purple enteral feeding connectors (ENFit) and the current female iv luer lock connection by way of the transition connectors. New purple-coloured paediatric power PICC lines being introduced into UK practice have increased the misconnection potential by adding colour confusion. The MHRA has been informed of the situation and SALG will report back with further information as it becomes available. Meanwhile anaesthetists are asked to raise awareness of this risk and to plan local mitigating strategies.

Potential misconnection with medication port, transition connector and female connection on PICC line plus colour confusion.

Safety refinements can occasionally lead to confusion and further problems (as seen above). The addition of a clear cap to prevent intrusion of foreign bodies into the patient end of a neonatal breathing system was mistakenly left in situ and a facemask was squeezed over the top in preparation for emergency bag mask ventilation. Following the delivery of an obtunded neonate, facemask ventilation failed and the breathing system obstruction was only identified after successful emergency endotracheal intubation. A two-bag check of ventilation would have ensured that the breathing system was ready for use.

Clear cap
LEARNING POINTS FROM REPORTED INCIDENTS

INTRATHECAL INJECTIONS
Spinal pack provided had incorrect syringe in pack. Coloured yellow but labelled as oral/enteral (normally coloured purple) and with wrong interlocking mechanism. This did at least prevent its use in conjunction with a Surety system.

Spinal anaesthesia was planned for a patient coming in for an emergency caesarean section. The Surety non-Luer Lock spinal needle was used for the anaesthesia. There was some difficulty in performing the procedure as I was using the needle for the first time. I felt the needle bending on insertion, and when I removed the introducer and spinal needle assembly I found the needle to be deformed. No harm came to the patient but there could have potentially been a shearing-off of the needle tip.

The new International Standards Organisation (ISO) standard for small-bore connectors, which includes neuraxial connectors, will be available in 2016. Manufacturers are expected to have ISO compatible products available for testing ahead of the standard’s implementation. Dr Paul Sharpe will be co-ordinating this evaluation across the UK. The two cases above demonstrate the need for heightened awareness and increased vigilance during periods of change. In addition, it is hoped that the co-ordinated evaluation and dissemination of the findings prior to the market launch of the new kit will facilitate a safe introduction to practice. Local induction processes will add to a safer process of introduction. Guidance is available on the NHS England website.1


NAP4 REMINDERS
Patient had severe ARDS and was ventilated via a tracheostomy that was less than 48 hours old. Patient was agitated and pulled the pilot balloon off her tracheostomy. Trainee doctors reinserted the tracheostomy as an emergency procedure. Patient went on to develop bilateral tension pneumothoraces and cardiac arrest. Patient died despite resuscitation, securing of airway translaryngeally and bilateral emergency thoracostomies.

Surgery finished, patient awaiting transfer to ITU post emergency laparotomy, and emerging from anaesthesia. ETT cuff leak noted, cuff rupture diagnosed, ETT replaced and pulmonary aspiration of gastric contents recognised.

Aspiration was the commonest cause of death reported in anaesthesia incidents in NAP4, and over a third of airway incidents occurred at emergence. Displaced tracheostomy tubes/endotracheal tubes were the commonest cause of major incidents in ICU1. Training in airway management should be a priority for ICM resident staff and support should be available via clear lines of communication to seniors.


ANAESTHESIA RELATED ANAPHYLAXIS
Patient became profoundly hypotensive approximately 20 minutes after induction.

Uneventful induction of anaesthesia with propofol, atracurium and fentanyl. On arrival in to OR noticed patient was hypotensive with a very poor ETCO2 and marked changes on ECG. BP about 40-50 mmHg, HR 50 and slowing, no bronchospasm, ETCO2 was 2kPa. Initial impression of shock secondary to cardiac incident – probably MI looking at ECG. Help requested and treatment for hypotension and bradycardia. Little or no response to escalating doses of metaraminol and ephedrine. While siting arterial and central line, cardiac output lost. CPR commenced for 90 seconds and adrenaline 1mg given. Output returned and adrenaline infusion started. BP about 50mmHg... ECG confirmed global ST elevation probably in RCA territory. Cardiology arranged urgent PCI and patient transferred on adrenaline and propofol. 3 x stents inserted into RCA and blood pressure rapidly improved. At this time patient was noted to be quite warm despite shock and adrenaline – possible anaphylaxis to induction dose precipitating MI. Chorphenaramine given.

The current NAP6 project intends to add to our understanding of anaphylaxis and anaesthesia in the UK. Current information suggests about 500 cases of severe anaphylaxis occur each year1 and of all cases admitted to ICU, mortality was <5%;2 A recent review from Australia of survival from anaphylaxis reported no deaths3. Hypotension is the sole presenting clinical feature in 10% of cases and symptoms may be delayed up to an hour after drug administration.

Kounis syndrome presents as vasospastic myocardial ischaemia triggered by inflammatory mediators released during anaphylaxis2. It is extremely rare but case reports are steady.


3. www.nationalauditprojects.org.uk/NAP4_home#pt
LEARNING POINTS FROM REPORTED INCIDENTS

WEIGHING UP RISK VERSUS BENEFIT
Ishaemic changes leading to necrosis of left 2,3,4 finger tips. Local review concluded:
1. An embolic event from the arterial line in the brachial artery.
2. Delay in referral to the vascular surgeons.
3. A combination of factors led to the degree of peripheral ischaemia identified.
4. All therapeutic manoeuvres that were supporting patient treatment were necessary for lifesaving procedures. Contribution of each to the final ischaemic picture cannot be qualified.

The rate of major complications from invasive arterial monitoring are quoted as being less than 1%. The use of arterial lines for sampling and monitoring has increased as critical care specialities have advanced. The reference below provides a comprehensive resource in considering how, where and when arterial lines should be inserted.


Patient came to main theatres for routine umbilical hernia repair with mesh under LA with sedation. In recovery following procedure had breathing difficulties… required nebuliser therapy… continued to deteriorate. Patient transferred to ITU. Intensivist’s view that patient had very poor cardiorespiratory reserve and the insult of the hernia repair, even under LA, was sufficient to precipitate cardiorespiratory failure. This may have been prevented if this level of risk had been recognised preoperatively. The anaesthetic consultant involved was given no prior notice of this case. For discussion at anaesthetic M&M and incident review – learning point: Recognition of perioperative risk that may be presented by even minor surgery under LA in such patients.

The Royal College of Anaesthetists launched the Perioperative Medicine: the pathway to better surgical care project in January 2015. The mission statement is: to “deliver more efficient healthcare and better outcomes for patients from contemplation of surgery until full recovery.” Thorough pre-operative assessment is recommended before surgery, and sharing of the outcome from this process between relevant teams of healthcare professionals.

CRISIS MANAGEMENT – AGREEING AND SHARING GOALS
Patient bleeding and cardiovascularly unstable… some blood and fluid resus given. Care handed over to theatres and urology for imaging and management of bleeding. Patient review 10 hours later in anaesthetic room… two anaesthetists present… patient’s HR 135 with ABP reading 65/35. No fluids running, no obvious pressor/inotropic support. Anaesthetic staff did not know how much blood or products the patient had received. Requested that they start IV fluids and support BP while myself and theatre nurse retrieved blood and FFP. Fluid resus continued while a number of urologists entered and discussed plans which included vascular input. I advised urology team that the patient was still actively bleeding, very unstable and very likely to suffer a cardiac arrest. A definitive management plan was unclear to me at this time, BP continued to drop with boluses of metaraminol to support. Right thumb and two fingers black and so R brachial A line removed.

Team in attendance agreed roles and actions in event of arrest. Arrest trolley placed at door of anaesthetic room. RIJ CVC placed by anaesthetist under US guidance. Two further anaesthetists arrived and attempted LA - line insertion. Noted that QRS was widening on monitor. Defib attached. Patient increasingly dysrhythmic with HR slowing to 65. No palpable pulse. Chest compressions commenced. 1 x Adrenaline. Further unit red cells. ROSC after approx 2 cycles CPR. Adrenaline infusion. Further anaesthetic consultant attendance.

Having a shared mental model during clinical emergencies is vital to the effective delivery of care by a functional and functioning team. SNAPPI is a call-out tool based on the SBAR handover tool and it aims to facilitate better crisis management. The use of a shared mental model reduces uncertainty within the team. We would recommend to colleagues who have found themselves dealing with such crises to consider doing an After Action Review (AAR) once the crisis is over. Originally instituted by the US Army in the 1970s, AARs offer a brief structured way to reflect on how the crisis was managed. This reinforces good practice and allows improvement to be made, if needed. AARs are essentially a quick and simple form of debriefing in clinical practice.

Doing an AAR consists of asking yourself and your colleagues, or your team the following questions:
- What was supposed to happen?
- What actually happened?
- Why were there differences?
- What can be learnt from this experience?

A brief explanation of AARs can be found on the NHS Scotland website.  

DON’T FORGET TO FLUSH

Patient developed muscle paralysis leading to short period of apnoea following routine flush of IV cannula on ESAU post appendectomy. Witness describes muscle jerking like a fit and patient had total recall of event and conversation as he attempted to talk to staff around him. Estimated duration was 1-2 mins. Cannula had been used for induction of anaesthesia with Propofol and Suxamethonium, anaesthetic chart stated that cannulae had been flushed.

Recognising that the end of a case is a busy time where simple things like flushing the cannula can be forgotten, many teams have added checking that all cannulae have been flushed to their debriefing checklist. This case adds to the other 16 highlighted by NHS England in their safety alert1. Oglesby et al offer up their simple and practical solution in a communication entitled Residual anaesthesia drugs – silent threat, visible solutions2.


UNINTENDED CONSEQUENCES

Admitted to hospital with acute abdomen. Patient previously had elective total knee replacement, after which discharged home with opioids leading to constipation (bowel not opened since then) pseudo obstruction. Re-admission with multi-organ failure. Admitted to ITU and then laparotomy. Died despite maximal therapy.

Opioids are prescribed routinely for the management of postoperative pain. Many patients experience constipation as a side-effect, and laxatives are recommended as a concurrent prescription. For some individuals, the consequence goes from constipation to bowel perforation1.

1. Concurrent drug use and the risk of perforated colonic diverticular disease: a population-based case–control study. Gut (http://gut.bmj.com/content/60/2/219.short).

GUARANTEEING VASCULAR ACCESS INTEGRITY

The patient went to cardiac theatre for removal of a biventricular assist device. The operation was performed by a senior team including three consultant cardiac surgeons and two consultant cardiac anaesthetists/ intensivists. A left subclavian vein (LSCV) Swan sheath was inserted and used for intravenous fluid infusions during the operation. The Swan sheath was inserted using a landmark approach. All evidence indicates that during the first part of the operation the Swan sheath was positioned in a major intra-thoracic vein. Two hours into the operation it was noted that the patient was not responding appropriately to IV fluid infusions. At around three hours it was noted that the patient’s visible head and neck was swollen; only a small area of head and neck could be visualised due to coverage by surgical drapes. It was felt that the swelling was due to endotracheal tube ties potentially obstructing venous return and the ties were loosened. At 5 hours the patient was sufficiently stable for the chest to be closed. Immediately after the chest was closed he sustained a cardiac arrest; he was resuscitated from this and the chest was re-opened. At this point the surgical drapes were taken down and the patient’s head was uncovered and found to be very swollen. The LSCV Swan sheath had come out by up to 5 cms. Over several hours the patient was stabilised in theatre and then returned to the critical care unit for further management. The patient was subsequently shown to have brain stem death.

SALG recommended that ‘sites of intravenous infusions should be visible so they may be monitored for disconnections, leaks or infusions into subcutaneous tissues’ in its guidance for TIVA following reports of patient harm1. Similar guidance pertains to other vascular access sites where drugs and fluids are being administered. When this is not possible sites should be checked at regular intervals.


NHS LITIGATION AUTHORITY AND SALG

The NHS Litigation Authority (NHSLA) has agreed to share with SALG the summarised information from closed claims recorded under the primary code of anaesthesia. The data contained is taken from the Claims Management System (CMS) which is the database held at the NHSLA. The database is not designed specifically for clinical analysis. When reviewing the CMS data it is important to be aware that claims can relate to multiple factors, and thus any case may not be settled on one specific cause. A closed claim does not necessarily mean negligence was proven; many claims are closed without any finding of negligence or payment. The data sharing is being piloted as an additional resource in the promotion of patient safety. Thematic analysis of NHS LA data with respect to anaesthesia has been published previously1. This new collaboration aspires to deliver a qualitative analysis.
How the themes identified will align with those derived from the NRLS is unclear. In future through collaborations with SALG, the themes may form the basis of a more in depth analysis of certain areas of the CMS.


Number and cost of closed claims related to anaesthesia

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Date of incidents</td>
<td>2005-2013</td>
<td>2007-2015</td>
</tr>
<tr>
<td>Number of claims</td>
<td>50</td>
<td>33</td>
</tr>
<tr>
<td>Successful claims</td>
<td>34</td>
<td>20</td>
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<tr>
<td>Damages paid</td>
<td>£1,615,958</td>
<td>£580,734</td>
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<tr>
<td>Defence costs</td>
<td>£214,845</td>
<td>£201,869</td>
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<tr>
<td>Claimant costs</td>
<td>£1,124,400</td>
<td>£777,950</td>
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<tr>
<td>Total claim cost</td>
<td>£2,955,203</td>
<td>£1,560,553</td>
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</tbody>
</table>

The claims were further themed from the CMS injury codes by the NHSLA Safety and Learning Lead to reflect specific anaesthesia themes agreed with the SALG representatives.

Themes found in closed claims

<table>
<thead>
<tr>
<th>Themes</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient information related to anaesthesia</td>
<td>Consent issue, risk of failure of anaesthetic technique</td>
</tr>
<tr>
<td>Dental damage</td>
<td>Knocking teeth out, damage to caps / crowns</td>
</tr>
<tr>
<td>Drug</td>
<td>Error, allergy, overdose, wrong drug</td>
</tr>
<tr>
<td>Epidural</td>
<td>Poor technique, failure, consent issues, side effects</td>
</tr>
<tr>
<td>Airway management</td>
<td>Poor technique, significant injury, failure of ventilation</td>
</tr>
<tr>
<td>Nerve damage</td>
<td>Specific regional block, spinal</td>
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<tr>
<td>Observation</td>
<td>Fall from table/trolley, failure to detect deterioration</td>
</tr>
<tr>
<td>Vascular access</td>
<td>Cannulation (peripheral and central)</td>
</tr>
<tr>
<td>Wrong site</td>
<td>Nerve block</td>
</tr>
<tr>
<td>Retained object</td>
<td>Guidewire</td>
</tr>
<tr>
<td>Awareness</td>
<td>Waking up during surgery, awareness of surgical procedure</td>
</tr>
<tr>
<td>Other</td>
<td>Diagnosis and consent to treatment of chronic pain</td>
</tr>
</tbody>
</table>

Examples of text included in NHSLA closed claims CMS

- Patient was anaesthetised for surgery. Patient woke up face-down on the operating table. Patient could not notify staff that they were awake due to recently being given a muscle relaxant.
- Failure to appropriately insert and monitor the cannula leading to the patient waking during surgery.
- Patient suffered burns from warmed saline bag.
- Front teeth were damaged during surgery.
- Erroneous administration of suxamethonium instead of fentanyl before surgery. Patient suffers from psychological damage.
- The patient was given penicillin to which she was allergic, during a cholecystectomy and suffered anaphylactic shock.
- Error with drugs resulting in respiratory collapse and cardiac damage.
- Failure to obtain informed consent for epidural; negligent performance of epidural; failure to diagnose development of post-dural headache; failure to treat dural headache in initial stages.
- Failed to adequately protect the airway following a dental operation, causing aspiration, lung collapse, ITU admission and subsequent lung infections.
- Patient suffered spinal cord injury from ISPB block, for which informed consent was not obtained.
- Iatrogenic injury to supraclavicular brachial plexus sustained during interscalene sleep block performed by anaesthetist.
- Patient fell from operating table.
- Tubing being cut near patients airway and flicked into eye causing visual loss.
- Claimant’s teeth were damaged during guided airway for general anaesthetic for knee surgery.
- Damage to dental crowns during induction of anaesthesia.
- Failure to flush cannula resulting in the administration of anaesthetic drug causing respiratory paralysis.
- Central line misplaced in carotid artery.
- Patient given a muscle relaxant instead of a sedative which resulted in patient experiencing periods of paralysis over body and awareness of the surgical procedure that was taking place.
- Post-dural puncture-headaches, shooting pains in legs and lower-back pain from undergoing repeated failed attempts to administer an epidural.

The clinical details given above are extracts from the NHSLA database. A few of the cases have some similarity to the reports sent to the NRLS. Many describe cases where incident reports are likely to be classified as minor to moderate injury or near misses. These cases do not feature in the SALG review because only reports of severe harm and death are reviewed by SALG. SALG are grateful to the NHSLA for the data made available for inclusion in the PSU, and comments on how the data can be made more useful to anaesthetists are welcomed.
ANAEASTHETIC EFORM

The anaesthetic eForm was designed to allow specific clinical information relating to anaesthetic incidents to be reported by anaesthetists and other members of the anaesthetic team, and can be found at [www.eforms.nrls.nhs.uk/asbreport](http://www.eforms.nrls.nhs.uk/asbreport).

The RCoA and AAGBI continue to work with the NRLS team at Imperial and the patient safety function of NHS England. SALG would like to emphasise that processes for sharing and learning incidents remain firmly in place. Staff are urged to continue to use the eForm (or their local reporting systems) to report patient safety incidents, so that trends and incidents can be acted upon and learning maximised. The eForm is particularly useful as it provides a mechanism by which high-quality information can be reported rapidly by members of the anaesthesia team and disseminated nationally.

Figure 1 shows the degree of harm incurred by patients within the anaesthetic specialty during the period July-September 2015. 9 deaths were reported though LRMS and none via the anaesthetic eForm.

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 July – September 2015. The categories were determined at local level.
A CALL FOR SAFETY PROJECTS

The SALG website features a Safety Project of the Month. This is space for members of the network and others to share projects that have contributed to patient safety or promoted the patient safety agenda in their hospitals. If you would like to submit a project for the website, please email the patient safety administrator at SALG@rcoa.ac.uk.

APPENDIX: INCIDENT DATA SUMMARY

A total of 7483 anaesthesia-related incidents were reported during the specified time period. Four incidents were reported using the Anaesthetic eForm; two (50%) of these incidents were reported to the National Reporting and Learning System (NRLS) within one day of occurrence. Four (100%) of the incidents reported to the eForm were reported as ‘near miss’ (harm was prevented from reaching the patient). 7479 incidents were reported using Local Risk Management Systems (LRMS); 193 (2.6%) of these incidents were reported within one day and 3769 (50.3%) were reported more than 30 days after they had occurred. Of the incidents reported via LRMS, 978 (13%) were reported as near miss.

All incidents reported via the eForm, and all those reported to the LRMS graded as ‘death’ or ‘severe harm’, were reviewed by the Patient Safety Team, now part of the Patient Safety Function within NHS England. Consultant anaesthetists from the RCoA or AAGBI reviewed incidents identified as having potential cause for concern. No information about the NHS Trusts was disclosed in this review; only information about the incident. Most incidents reported via the eForm were completed by consultant anaesthetists, although the eForm is available to all members of the perioperative team.

As with any voluntary reporting system, interpretation of data should be undertaken with caution as the data are subject to bias. Many incidents are not reported, and those that are reported may be incomplete, having been reported immediately and before the patient outcome is known. Clarity of ‘degree of harm’ to patients who experience a patient safety incident is an important aspect of data quality.