



APSA newsletter.

July 2026 Vol:1 Issue:4

ANAESTHESIA PATIENT SAFETY ASSOCIATION - INDIA

SPECIAL INSIGHTS . SHARED EXCELLENCE

In this issue...

Since the Anaesthesia Incident Registry (AIR) was launched in February, each newsletter has shared reports from colleagues who chose to pause, reflect, and contribute to our collective safety. Four issues in, we are seeing something important take shape: a growing record of real experiences that our community is willing to learn from, together.

From this month, the *APSA Newsletter* moves to a bimonthly schedule. This shift allows us to examine reports with greater care and draw out the practical lessons that must follow. Our next issue will be in September.

This edition features five new incidents. They are different in their details, but familiar in the questions they ask of us. A fascia iliaca block performed on the wrong side after the emergency notes and radiograph were at odds. It is a reminder that laterality must be confirmed by the clinician at the point of needle insertion, not assumed from paperwork. A patient whose experience was made worse by rough handling and dismissive communication. Safety includes how we speak to those who are anxious, in pain, or vulnerable. We also report a patient fall from the operating table after a procedure under local anaesthesia. It highlights that repositioning and transfers are clinical moments that require planning and assistance. A syringe swap where phenylephrine was administered instead of atracurium brings us back to a basic safeguard: syringes must be labelled clearly and immediately. Finally, an epidural catheter migration presenting with an unexpectedly dense block and hypotension reminds us to reassess the catheter whenever the block behaves differently than anticipated.

The accompanying articles focus on high-stakes readiness. Dr Atul Aman Tiwary and Dr Jami Biswanath Senapati discuss operating room fire safety — a rare event, but one for which every team must have a shared plan. Dr Bhuvaneswari Balasubramanian and Dr Abhishek Lonikar ask a critical question about the machine pre-use check: are we truly verifying the workstation, or merely completing a routine? Both remind us that safety often depends on small actions performed properly, every single time.

As a special half-yearly recap, we have included all incidents published in our previous newsletters following the five new reports. This is an opportunity to revisit recurring patterns and take these discussions back to our own departments.

These reports remain anonymous. Their purpose is not to assign blame, but to help us ask the only question that matters: what can we do differently next time?

We are deeply grateful to the clinicians who shared these incidents. It takes honesty and professional courage to speak up. We thank our reviewers for their careful analysis, and our editorial and creative teams for their dedication in bringing this edition together.

Read it carefully. Discuss it with your team. Safety is not a habit you develop once; it is a decision you make, every time you step into the theatre.

Dr Murali Thondebhavi
Project Lead, Anaesthesia Incident Registry



Dr Sunil Pandya

National Chairman, APSA India

Dear Friends and Colleagues,

It gives me immense pleasure to present another edition of the Anaesthesia Patient Safety Association (APSA), India Newsletter.

This newsletter is much more than a compilation of events and activities, it is a reflection of our collective commitment to making anaesthesia and perioperative care safer across India. Every article, every case discussion, every podcast, and every educational initiative reinforces our shared belief that learning from experience is the cornerstone of patient safety. I extend my heartfelt gratitude to the distinguished experts of the anonymous, National Anaesthesia Incident Registry (AIR) for their painstaking analysis of perioperative and critical care incidents. Your thoughtful reviews transform adverse events and near misses into valuable learning opportunities, helping us build systems that are safer, stronger, and more resilient.

My sincere appreciation also goes to our dedicated Anaesthesia Patient Safety Ambassadors, website team who continue to spread the message of safe anaesthesia across the country with remarkable enthusiasm and commitment. A special word of thanks to our Podcast Team, whose insightful conversations are reaching anaesthesiologists far beyond conference halls; our Social Media Team, who have successfully amplified patient safety messages to a wider audience; and our Newsletter Editorial Team, whose tireless efforts ensure that every edition remains educational, relevant, and inspiring.



"Patient safety is not an event, it is a culture. Every incident analysed, every lesson shared, and every life protected brings us one step closer to excellence."

I would also like to acknowledge our valued partner, CAHO, for successfully collaborating with APSA India in launching the first Online Training Course in Anaesthesia Patient Safety for anaesthesiologists, a significant milestone in structured patient safety education. My congratulations also to the organizing team of the highly successful NORA Safety Workshop held at Sri Ramachandra Institute of Higher Education and Research (SRIHER), Chennai, which highlighted the unique safety challenges in Non-Operating Room Anaesthesia and the practical strategies to address them.

The APSA movement continues to gather momentum. Our growing community of passionate clinicians, educators, researchers, and safety champions is creating a national platform where transparency, learning, and continuous improvement are valued above blame.

Yet, this is only the beginning.

The road ahead is exciting and challenging. Expanding the Anaesthesia Incident Registry, strengthening simulation-based education, developing evidence-based safety guidelines, promoting multicentre research, nurturing young patient safety leaders, and creating a nationwide culture of reporting and learning remain our collective mission. Patient safety is not the responsibility of a few, it is the responsibility of every anaesthesiologist, every member of the perioperative team, and every healthcare institution.

Let us continue to learn together, improve together, and lead together. Because every patient deserves the safest anaesthesia. Every single time.

With warm regards,

Dr. Sunil T. Pandya

Chairman

Anaesthesia Patient Safety Association (APSA), India

"Excellence in anaesthesia is measured not only by successful outcomes, but by our unwavering commitment to prevent harm before it occurs. Together, let us build a future where safety is our greatest legacy."



Anaesthesia Incident Registry [AIR] - Getting Docked to Patient Safety

There is something most of us recognise but rarely say aloud — that some of the most important lessons in our careers came not from textbooks or conferences, but from cases that didn't go as planned. A difficult airway that tested us. A drug error that shook us. A near-miss that we carried home and couldn't quite put down.

In most instances, those experiences remain exactly that — personal. Discussed quietly with a trusted colleague, perhaps, and then filed away. Our culture has long treated complications as matters of individual accountability rather than opportunities for collective learning. That instinct is understandable. But it comes at a cost. Every incident that goes unreported is a lesson that never reaches the colleague who needed it most.

It is with that conviction that the Anaesthesia Incident Registry (AIR) was established.

What AIR is — and What it is Not

AIR is a national, voluntary, and fully anonymous incident reporting platform for anaesthetists across India. It operates through the DOCKED app, which is free to download and free to use.

Incidents are reported without any patient identifiers, hospital details, or reporter information.



SIMPLIFY. STREAMLINE.

Each report is reviewed by a panel of over 50 expert anaesthetists drawn from across the country, representing every subdomain of our specialty.

Their analysis — grounded in current evidence and clinical experience — is compiled into structured learning points and shared with the broader anaesthesia community through this newsletter, every month.

AIR is not a surveillance mechanism. It exists for one purpose only — to help us learn from experience, collectively and without judgement.

An Invitation To Participate

Every anaesthetist reading this has, at some point, encountered a situation that gave them pause — an unexpected complication, a system failure, a moment where the outcome could easily have been different. In the vast majority of cases, those experiences are never formally recorded. They remain in individual memory, and when we retire, they retire with us.

WE ARE ASKING YOU TO CHANGE THAT.

Report your incidents on DOCKED — anonymously, without fear, and without the burden of formal documentation. A near-miss is worth reporting. A system problem is worth reporting. Any case that made you think this could have gone very differently is worth reporting.

There are over 50,000 anaesthetists practising in India. If we build a culture of reporting — even among a fraction of that number — we will create the most comprehensive anaesthesia safety dataset this country has ever had. The lives saved will not make headlines. But they will be real.

The Lesson From Aviation

The transformation of commercial aviation safety over the past few decades offers a compelling parallel.

In the 1970s, flying carried a genuine and significant risk. Today, it is among the safest modes of transport in the world. The IATA Annual Safety Report (2024) documents this shift in stark terms — the accident rate in commercial aviation fell from 3.72 per million sectors in 2005 to 1.13 in 2024, a reduction of nearly 70% in under two decades.

It was a cultural shift that achieved this progress in safety. The aviation industry built a system in which every incident, every near-miss, and every operational anomaly was reported, investigated, and learned from — systematically and without attribution of blame. ICAO Annex 13 highlights this principle explicitly: *the purpose of incident investigation is "the prevention of accidents and incidents" — not to apportion blame or liability.*

That shift — from individual accountability to systemic learning — is what made aviation safer. It is the same shift we are asking anaesthesia in India to make.

What Has Been Achieved Elsewhere

The evidence from other countries is instructive. The ASA Closed Claims Project, established by the American Society of Anesthesiologists in 1984, has spent four decades systematically analysing anaesthesia-related malpractice claims. The longitudinal data tell an encouraging story — a meaningful reduction in catastrophic outcomes, including death and permanent neurological injury, over the course of those years. That improvement was not incidental. It was the direct result of honest, data-driven examination of what was going wrong.

In the United Kingdom, the Royal College of Anaesthetists' National Audit Projects (NAPs), running since 2003, have produced landmark analyses of major airway complications, accidental awareness under anaesthesia, perioperative anaphylaxis, and cardiac arrest. Their findings have influenced clinical practice well beyond British shores — including, in many cases, our own.

We have drawn on these resources for long enough. The time has come to build something of our own.



Alignment With National Policy

What lends this initiative particular weight is that it is not merely a professional aspiration — it is a response to an explicit national mandate.

The National Patient Safety Implementation Framework (NPSIF) 2018–2025, issued by the Ministry of Health & Family Welfare, Government of India, calls for the establishment of a reporting system that is "non-punitive, confidential, independent, timely, system-oriented and responsive in nature." It mandates that anonymous incident reports "be examined by an independent agency" and acknowledges that adverse events are "mainly attributed to failure of the system rather than an individual."

The DOCKED-APSA model is designed precisely to fulfil these requirements. DOCKED provides the anonymous reporting infrastructure. APSA functions as the independent reviewing body. The expert panel conducts the analysis. This newsletter completes the cycle by returning the learning to the community.

A Word Of Gratitude!

The AIR exists because of a collective effort — the team behind the DOCKED app, our expert reviewers, the APSA family, and the teachers and mentors who shaped our belief that we owe it to our patients to always do better.

To the anaesthesia community — thank you for reading. We hope you will join us.

Warm regards,
Anaesthesia Incident Registry Team

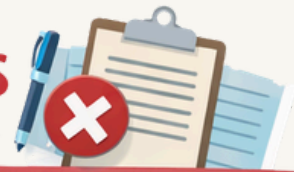
Thank you for being part of this nationwide initiative to improve patient safety in anaesthesia. Your incident reports are the foundation upon which APSA will build meaningful guidelines, learning points, and ultimately, safer practice across India.

To ensure your contributions have the greatest impact, while maintaining the complete anonymity we have promised, here are a few simple guidelines.

What to Report:

Every Submission helps APSA generate the most useful guidelines and learning points

Reporting: Dos & Don'ts



DO REPORT



Clinical details: Sequence of events, drugs used, doses (no patient identifiers).



Context: Type of surgery, setting (OT/ICU/emergency), time of day.



Outcome: What happened, how it was managed, final result.



Human factors: Communication issues, fatigue, equipment challenges.



"Near Misses:" Events that were caught in time before causing harm.



DO NOT INCLUDE



Patient names, UHIDs, or registration numbers.



Exact dates (month and year are sufficient).



Specific hospital names or locations.



Colleague names or designations.



Any detail that could uniquely identify a patient or institution.

**"Your voice,
anonymised but
powerful,
shapes safer
anaesthesia for
everyone."**

— Team Docked



The Ripple Effect of Your Report:

Every log you submit -

- 1) Contributes to national data on anaesthesia incidents.
- 2) Helps identify emerging patterns and risks.
- 3) Contributes to the monthly guidelines and learning points.
- 4) Ultimately protects patients and colleagues across India.



How the App Protects Your Anonymity

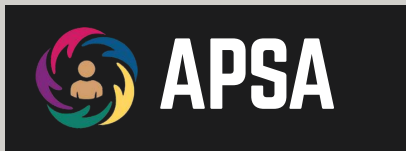
We designed the AIR portal with privacy as its cornerstone. When you submit a report-

Design Feature	What It Means for You
No patient identifiers captured	The app does not ask for—and cannot store—name, UHID, address, or any details that could identify a patient
No reporter information collected	We do not capture your name, registration number, hospital, or any data that could trace the report back to you
Auto-delete after 7 days	Once submitted, the log is visible to expert reviewers for only 7 days, then automatically deleted from their view
No local storage	Reports are not saved on your device; they are securely transmitted and stored only in the central database
No downloading permitted	Reviewers cannot download, screenshot, or print logs—ensuring your submission stays within the secure portal

**“You Remain,
And Will
Always Remain,
Completely
Anonymous.”**

— Team Docked





ANAESTHESIA INCIDENT REGISTRY

We are pleased to present the report of the Anaesthesia Incident Registry (AIR). All incidents were reported anonymously through the Docked App.

These incidents were analysed and grouped into categories based on the classifications entered by the reporting clinicians.



Where incidents shared common themes or overlapping elements, they were clubbed together based on inputs received from our expert panel. Key takeaway messages have been formulated drawing upon these expert opinions and the best available evidence in the current literature.

In keeping with our commitment to maintaining complete anonymity of the reporting clinicians, a brief summary of each incident has been presented, followed by the relevant key takeaway messages.

Beyond Bedside Manner: Empathy as a Patient Safety Imperative in Anaesthesia

A patient scheduled for a lower limb procedure related to peripheral arterial disease experienced discomfort during wound dressing removal by a theatre support staff member, who removed the dressing without first releasing the securing tape, prompting a vocal complaint from the patient. Shortly thereafter, the same staff member placed a warming device without adequate care, inadvertently applying pressure over an indwelling intravenous cannula and causing further pain. The patient verbally declined further assistance from the staff member, citing concerns about the manner in which care was being delivered. The situation was escalated when the operating surgeon intervened and directed the patient to moderate their response, which the patient perceived as dismissive, further deteriorating the therapeutic relationship.

Patient safety and quality of care have long been recognised as the product of an interplay between human and non-human factors.⁽¹⁾ What was once dismissed as a vague soft skill has since evolved into a rigorous science. Neuroscientific research has reinforced this transition by establishing a clear neurobiological basis for empathy through the discovery of the mirror neuron system.^(2,3)

While effective leadership propels an institution towards clinical excellence, compassion and empathy serve a complementary and equally vital function — promoting individual wellbeing and actively reducing patient distress.⁽¹⁾ For the anaesthetist, the preoperative visit represents the primary and often singular opportunity to forge an empathetic, compassionate relationship with the patient. This connection, once established, carries forward through the entire conduct of anaesthesia and into the postoperative period.

The significance of the patient-anaesthetist relationship was brought into sharp focus by the 5th National Audit Project (NAP5), which demonstrated that early psychological support and empathic engagement appeared to mitigate the long-term psychological sequelae of accidental awareness during general anaesthesia.⁽³⁾ Cultivating higher emotional intelligence (EI) — encompassing self-awareness, self-management, social awareness, and relationship management — has a direct bearing on patient safety and clinical performance.⁽³⁾ While instruments such as the DiSC profile offer value in addressing workplace dynamics, improving departmental communication, and advancing professional culture, it is individual empathy that most directly transforms patient-reported outcomes.⁽⁴⁾

Empathy reduces patient anxiety and psychological stress, improves postoperative recovery scores, and enhances patient enablement. Collectively, these outcomes culminate in greater overall patient satisfaction with perioperative care — securing a safer, more effective anaesthetic experience for every patient.^(3,4)

1. Ahmed Z, Ellahham S, Soomro M, Shams S, Latif K. Exploring the impact of compassion and leadership on patient safety and quality in healthcare systems: a narrative review. *BMJ Open Qual.* 2024 May 7;13(Suppl 2):e002651.

2. Derksen F, Bensing J, Lagro-Janssen A. Effectiveness of empathy in general practice: a systematic review. *Br J Gen Pract.* 2013 Jan;63(606):e76-84.

3. OC, Looper JN, Sumner SS, Janelle GM. Are you emotionally intelligent? Improving patient safety and quality through better communication. *J Cardiothorac Vasc Anesth.* 2022;36(4):936-939.

4. B, Stubbs DJ, Levy N. Can empathy improve surgical and patient-reported outcomes: benefit to an 'identifiable patient effect'? *Br J Anaesth.* 2020 Jun;124(6):e225-e226.



Grounded but Not Forgotten: Preventing Falls and Injuries in the Perioperative Environment

A patient undergoing an elective urological procedure under local anaesthesia was positioned in the lithotomy position by theatre support staff in the absence of an anaesthesiologist. At the conclusion of the procedure, the patient was verbally instructed to reposition on the table; no physical restraints or assisted transfer protocol was in place. The patient attempted to move independently, lost balance, and fell to the theatre floor, sustaining an injury to the left wrist. Primary survey by the attending surgical and anaesthesia teams revealed a swollen left wrist; plain radiography confirmed an undisplaced fracture of the distal radius, and the patient and family received formal counselling by senior hospital leadership.

Falls and injuries in the operating theatre — encompassing OT table falls, transfer-related incidents, pressure injuries, and staff tripping accidents — are uncommon but consistently preventable. The principal risk factors include human error, poor staff coordination, staffing shortages, equipment-related hazards, and the inherent vulnerability of patients under anaesthesia. [1] Data from one tertiary centre revealed that 1% of 8,337 perioperative safety reports were fall-related; of these, 15% involved falls from a bed or stretcher, the majority fortunately resulting in no or only minor harm. [2] Notably, prolonged duration of general anaesthesia has been independently identified as a risk factor for postoperative falls in orthopaedic inpatients. [3]

The encouraging reality is that the vast majority of these events are preventable. Preoperatively, structured screening protocols for high-risk patients — combined with multifaceted, interdisciplinary prevention strategies — can meaningfully reduce fall incidence. Anonymous incident reporting and systematic learning from near-misses are equally critical, enabling teams to identify and address systemic vulnerabilities before harm occurs. [1] The power of bundled interventions is illustrated by a study in which a perioperative fall-prevention bundle — comprising a fall safety agreement, targeted patient education, and the Fall T.I.P.S. tool — was associated with zero patient falls during a 16-week implementation period. [4]

Coordinated team transfers using sliding or roll boards, adequate staffing levels, and the application of secure yet non-injurious patient restraints are essential to preventing falls during patient movement. [5] Meticulous intraoperative positioning, appropriate support surfaces (including gel pads and positioning pillows), and vigilant attention to surgery duration and individual patient risk profiles are the cornerstones of pressure injury prevention. [5]

Strong teamwork, clear communication, and consistent adherence to safety protocols and checklists — underpinned by regular staff training, robust incident reporting systems, and ergonomic principles in OT design — can substantially enhance anaesthesia patient safety across the entire perioperative pathway. [1] [4]

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1. Okuyucu K. Enhancing patient safety: identifying fall risks during patient transfers in operating rooms. *BMC Health Services Research*. 2025;25.
 2. Tan J, Krishnan S, Vacanti JC, Wheeler KK, Giovannini ST, Pimentel M, Urman R. Patient falls in the operating room setting: an analysis of reported safety events. *Journal of Healthcare Risk Management*. 2022.
 3. Hata T, Shima H, Nitta M, Ueda E, Nishihara M, Uchiyama K, Katsumata T, Neo M. The relationship between duration of general anaesthesia and postoperative fall risk during hospital stay in orthopaedic patients. *Journal of Patient Safety*. 2022;18:e922–e927.
 4. Kelley R, Gutchell V, O'Neill K. Preventing falls in the surgical setting by implementing a fall prevention bundle. *Journal of PeriAnesthesia Nursing*. 2023.
 5. Prielipp R, Weinkauff JL, Esser TM, Thomas B, Warner M. Falls from the O.R. or procedure table. *Anesthesia & Analgesia*. 2017;125:846–851.

Label It Right: Colour-Coded Syringe Labels as a Front-Line Defence Against Medication Errors in Anaesthesia

A patient scheduled for emergency bilateral ureteric stenting for pyelonephritis was induced under general anaesthesia, following which a member of the anaesthesia support team administered what was believed to be a neuromuscular blocking agent. After a standard three-minute wait, the patient remained spontaneously breathing with no evidence of neuromuscular blockade. On investigation, it was discovered that phenylephrine had been inadvertently administered in place of atracurium. Both syringes carried hand-written labels on plain white stickers with no colour coding, making visual differentiation between drug classes impossible at the point of administration.

Medication errors remain a significant and preventable source of patient harm in anaesthesia, with syringe swaps and drug misidentification among the most frequently reported contributors. Standardised, colour-coded syringe labels offer a simple yet demonstrably effective strategy to enhance drug recognition, reduce cognitive load, and promote consistent practice across institutions. [1]

The international standard ISO 26825:2020 specifies the colour, design, and performance requirements for user-applied syringe labels, assigning distinct background colours to each drug class — yellow for induction agents, blue for opioids, fluorescent red for neuromuscular blocking agents, and white diagonal stripes for antagonist drugs. [2] These visual cues facilitate rapid, reliable identification, particularly under the time pressure of an emergency. Importantly, however, colour coding is designed to complement — not substitute for — careful verification of the drug name, concentration, and expiry date, since different agents within the same pharmacological class share identical label colours. [1] [3]

Every syringe must be labelled immediately after the medication is drawn up and before it is removed from the preparation area. A compliant label should clearly display the drug name, concentration, date, time, and the operator's initials. [2] The use of pre-printed labels, barcode-assisted medication verification where available, and systematic double-checking of high-alert medications further strengthen the safety framework. [3]

Colour-coded syringe labels are not merely identifiers — they are an integral component of a comprehensive perioperative medication safety strategy. When combined with standardised preparation workflows and sustained clinical vigilance, they function as an effective and practical barrier against preventable drug errors in anaesthesia. [1] [3]



1. Larmen -Beld KHM, Alting EK, Taxis K. A systematic literature review on strategies to avoid look-alike errors of labels. *Eur J Clin Pharmacol.* 2018;74:985–993.

2. International Organization for Standardization. ISO 26825:2020. Anaesthetic and respiratory equipment — User-applied labels for syringes containing drugs used during anaesthesia — Colours, design and performance. Geneva: ISO; 2020.

3. Laxton V, Maratos FA, Hewson DW, Baird A, Stuppel EJN. Standardised colour-coded compartmentalised syringe trays improve anaesthetic medication visual search and mitigate cognitive load. *Br J Anaesth.* 2023;130(3):343–350.

On the Move for the Wrong Reasons: Recognising and Managing Epidural Catheter Migration

A patient undergoing surgical fixation of a mid-shaft femoral fracture received a combined spinal-epidural technique with a continuous epidural infusion for perioperative analgesia. Following initiation of the epidural infusion, the patient developed progressive motor blockade of greater intensity than anticipated for the volume and concentration of local anaesthetic administered. Concurrent haemodynamic instability in the form of hypotension was also observed, raising clinical concern for unintended intrathecal placement of the epidural catheter. The epidural infusion was suspended and the patient was managed supportively, with the episode prompting a review of catheter placement technique and post-siting monitoring protocols.

Epidural catheter migration refers to the displacement of a correctly sited epidural catheter from its original position, resulting in inadequate analgesia or an altered block profile. Migration may occur in either direction: outward, where the catheter partially or completely withdraws from the epidural space, or inward, where it advances further to encroach upon the intrathecal, subdural, intravascular, or paravertebral spaces. [1,2]

Outward migration is the more prevalent form and typically manifests as diminishing analgesic efficacy, a unilateral or patchy block, or recurrence of pain despite appropriate dosing. Inward migration carries potentially serious consequences. Intrathecal migration may produce an unexpectedly dense motor block, an excessively high sensory level, and haemodynamic instability. In contrast, intravascular migration may present as failed analgesia or overt signs of local anaesthetic systemic toxicity following drug administration. Subdural migration is characterised by a delayed, disproportionately extensive sensory block with minimal motor involvement and a clinically unpredictable course. [1,2]

Several factors predispose to catheter migration, including inadequate fixation, patient movement, obesity, excessive catheter length threaded into the epidural space, and repeated changes in patient position. [1,3] To minimise risk, current practice recommends advancing the catheter no more than 3–5 cm into the epidural space and securing it with an appropriate dressing. Routine surveillance of catheter depth markings at the skin entry point, aspiration before each dose, and the administration of a test dose when clinically indicated collectively support early detection of displacement. [2,3]

When epidural analgesia becomes unexpectedly ineffective, or when the characteristics of the block change, catheter migration must be actively suspected. Assessment should include re-examination of the catheter depth at the skin, careful aspiration for blood or cerebrospinal fluid, and systematic evaluation of the sensory and motor block. [1,2] When migration is confirmed or strongly suspected, catheter replacement is generally preferable to the repeated administration of escalating doses through a potentially malpositioned catheter. Early recognition and prompt intervention are essential to sustain effective analgesia and avert serious perioperative complications.

1. Jose R, Greenlin L, Isac D, Yadav B, Joselyn AS. Epidural catheter migration in non-obstetric adult surgical patients: a prospective, observational, cohort study. *Indian J Anaesth.* 2023;67(6):509–514.
2. Gautam S, Agarwal A, Das PK, Khuba S, Kumar S. Prevention of epidural catheter migration: a comparative evaluation of two tunneling techniques. *Korean J Anesthesiol.* 2021;74(1):59–64.
3. Hamilton CL, Riley ET, Cohen SE. Changes in the position of epidural catheters associated with patient movement. *Anesthesiology.* 1997;86(4):778–784.



Wrong-Side, Wrong-Outcome: Preventing Laterality Errors in Regional Anaesthesia

A fascia iliaca block was requested from the emergency department at 2:00 am for a patient with a hip fracture, and the patient had already been sedated with fentanyl on arrival. Based on the emergency notes, which documented a left neck-of-femur fracture, an ultrasound-guided block was performed uneventfully and a catheter was placed. During documentation, the radiograph was reviewed and the laterality error was recognised, prompting immediate documentation of the discrepancy and reassurance of both the patient and the surgical team. The block was then correctly repeated on the fracture side, with local anaesthetic dosing carefully calculated to minimise the risk of local anaesthetic systemic toxicity.

Physicians are human, and unintentional errors can directly compromise patient safety. Wrong-side regional blocks remain among the most preventable clinical errors and are the anaesthetic equivalent of wrong-site surgery. Wrong-side block refers to a block performed on the wrong side, wrong body part, or wrong patient, and reported rates of wrong-sided peripheral nerve blocks have been as high as 7.5 per 10,000 cases, with femoral blocks being the most common site for laterality errors. [1][2]

These events arise from a combination of human and system factors, including left-right confusion, language barriers, obscured site markings, sudden team changes, and delays after the safety checklist. [3] The broader patient safety movement gained momentum after the 1999 Institute of Medicine report *To Err Is Human* and the 2009 WHO Safe Surgery goals, which together helped shape later procedural safeguards such as the Universal Protocol and pre-procedural checklists. [3]

Best practice prevention begins with verifying the correct patient, correct site, and valid consent. Experts recommend using the primary surgical site mark rather than creating a separate block mark, to avoid confusion. If a wrong-side block occurs, the response should be immediate: stop the procedure, assess for harm, notify anaesthesia and surgical leadership, inform the patient honestly, and document the event clearly. [4][5]

A final block-specific “Stop Before You Block” time-out should be performed immediately before needle insertion to reconfirm laterality and ultrasound orientation. Every member of the operating room team must be empowered to speak up at once if any discrepancy is detected, because standardized checklists and a culture of psychological safety are central to preventing wrong-sided blocks. [4][5]

1. Hudson ME, et al. Wrong-site nerve blocks: 10 yr experience in a large multihospital health-care system. *Br J Anaesth.* 2015;114(5):818–824.
2. DeLeon AM, et al. When left is right and right is wrong: a case report of two near-miss wrong-sided peripheral nerve blocks. *Case Rep Anesthesiol.* 2022;2022:1–4.
3. Barrington MJ, et al. Wrong-site regional anesthesia: review and recommendations for prevention. *Curr Opin Anaesthesiol.* 2015;28(6):670–684.
4. Malone K, et al. 201 ‘Stop Before You Block’: re-audit of compliance and breaking down barriers to implementation. *Reg Anesth Pain Med.* 2021;70(Suppl 1):A104–A105.
5. Joint Commission. Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery™.



The Unseen Block: A Critical Reminder for Equipment Checks

At the start of the day, my first case was a middle-aged man posted for laparoscopic umbilical hernia repair. After the routine call-out and attachment of standard monitors, I induced anaesthesia with fentanyl and propofol, maintaining a firm mask seal while awaiting capnography to confirm ventilation. Despite repeated attempts and an apparently well-fitted mask, the reservoir bag remained motionless, raising immediate concern. A quick check revealed the cause: the cap on the catheter mount had not been removed, silently preventing effective ventilation.

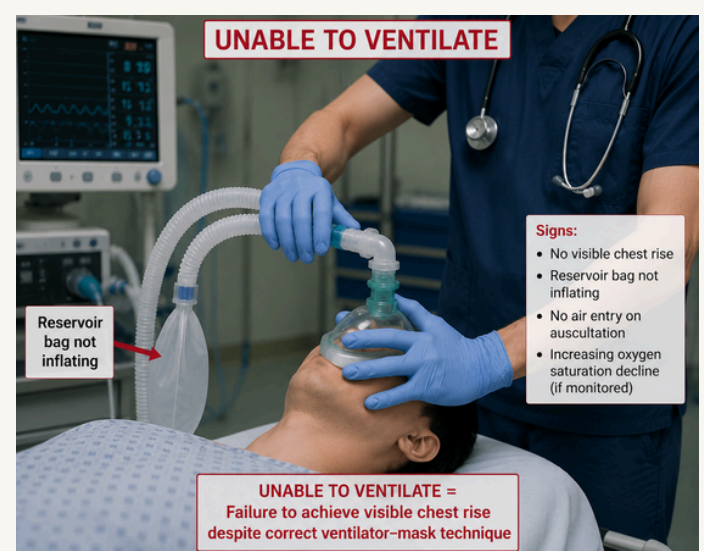
A tragic incident reported in the United Kingdom in 2001 highlighted a major patient-safety concern in anaesthesia practice. Following induction of anaesthesia for a minor surgical procedure in a child, complete airway obstruction occurred because a cap from an intravenous administration set became lodged within the angle piece connecting the circuit and filter to the face mask. As the cap was translucent, it was not readily visible within the coloured plastic angle piece. The resulting hypoxaemia led to the death of a nine-year-old boy (1).

This incident led to the formation of an expert committee on blocked anaesthetic tubing, which concluded that unsafe handling practices, particularly leaving disposable components open in trays containing other equipment, contributed to such events (2). A similar episode was later reported in India, where the cap covering a catheter mount had not been removed and the patient could not be ventilated. Fortunately, in that case, the obstruction was identified before serious harm occurred (3).

Although disposable components are routinely used in anaesthesia and replaced for each patient, their safe use depends on meticulous preparation and checking. In high-turnover areas such as minor operation theatres, time pressure and hurried workflow may increase the likelihood of incomplete equipment checks. In addition, the similarity between the dimensions of protective caps and the internal diameter of breathing circuit components creates a persistent risk of inadvertent obstruction.

The anaesthesia apparatus checkout recommendations clearly state that, although technical staff may assist in equipment preparation, the ultimate responsibility for ensuring proper function of the equipment rests with the anaesthesiologist (4). Therefore, failure to perform a complete check of the breathing system assembly before every case represents a serious lapse in patient safety and may amount to professional negligence.

1. Grüber L, Staender S, Rossaint R. Safety first: Checking the anaesthesia machine. *Eur J Anaesthesiol.* 2020 Oct;37(10):837-838. doi: 10.1097/EJA.0000000000001170. PMID: 32324624.
2. Carter JA. Checking anaesthetic equipment and the expert group on blocked anaesthetic tubing (EGBAT). *Anaesthesia.* 2004. p. 105-107. doi:10.1111/j.1365-2044.2004.03617.x PubMed PMID: 14725510.
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Silent Disconnects: Unplanned Extubation and Misconnection in Anaesthesia

During an elective tonsillectomy, the ventilator began alarming for low tidal volumes and leak, with reduced chest rise and a falling end-tidal CO₂. Closer inspection revealed that upward pressure during throat pack insertion had partially dislodged the endotracheal tube, with the tip now lying high in the oropharynx and an audible leak around the cuff. The throat pack was promptly removed, the tube was repositioned under direct laryngoscopy to an appropriate depth, and cuff pressure and fixation were reassessed. Ventilation parameters and gas exchange normalised, and surgery proceeded uneventfully.

Unplanned accidental extubation may occur when a patient intentionally dislodges or removes the endotracheal tube (self-extubation) or when external forces applied during patient movement, transport, or nursing care result in tube displacement (accidental extubation).(1) Such events may arise in the operating room, intensive care unit, emergency department, procedural areas, or during intra- and inter- hospital transport and are associated with considerable morbidity and mortality.(1) Reported risk factors include patient movement, manipulation of the endotracheal tube, inadequate sedation, inadequate tube securement, lack of physical restraints, restlessness or agitation, delirium or confusion, prone positioning, absence of clear policies and procedures related to weaning, lack of a clear plan for extubation, and inadequate staffing.(1) Immediate complications of unplanned extubation include injury to the vocal cords or trachea, hypoxemia, hemodynamic instability, respiratory failure, brain injury, cardiac arrest, and death.(1)

Desaturation and misconnection represent related but distinct anaesthesia safety concerns, with misconnection constituting a preventable, equipment-related cause of desaturation.(2) Reported errors include accidental connection of a patient to the exhalation valve of a transport ventilator, failure to switch on the ventilator, misconnection of the patient's breathing circuit to the anaesthesia machine, and attempts to ventilate a patient while the ventilator remained in self-test mode.(2) Such misconnections have been associated with a spectrum of hypoxemia-related adverse outcomes, including vegetative state and death.(2)



In the setting of persistent desaturation, immediate management should include hand ventilation with 100% oxygen, application of the COVER mnemonic, and return of the patient to a supine position.(3) The COVER mnemonic comprises Colour, Circulation, Capnography; Oxygen; Ventilation and Vaporisers; Endotracheal tube or Equipment; and Review.[1][2] This is followed by the ABCD and A SWIFT CHECK sequence as secondary actions: Airway, Breathing, Circulation, Drugs, Air and Allergy, and a final structured review of the situation, including surgeon awareness, fluid balance, wound site, and temperature.[1][2] Rigorous equipment checks and adherence to standardized crisis-management algorithms remain essential in preventing avoidable complications in anaesthesia practice.(3)

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The Real Airway Crisis : When Intubation Fails and Oxygenation Matters

A diabetic patient with a short neck, limited neck extension, and a positive palm print sign presented for ERCP under general anaesthesia. After induction, ventilation was initially easy, but direct laryngoscopy revealed a Cormack-Lehane grade 3 view; attempts with a McCoy blade and blind bougie insertion failed to achieve tracheal intubation. Mask ventilation was re-established, and the procedure was abandoned while the team secured the airway with a supraglottic device and prepared for possible front-of-neck access.

In airway management, the principal danger lies not merely in difficulty with tracheal intubation, but in the inability to maintain oxygenation when intubation fails. Anticipated difficult airway scenarios are therefore often most appropriately managed with awake tracheal intubation. However, when airway management is undertaken after induction of anaesthesia, the use of short-acting neuromuscular blocking agents may significantly improve intubating conditions. A critical patient- safety principle is that neuromuscular blockade should never be administered without preparation for failure; adequate preoxygenation, confirmation of ability to ventilate, availability of backup airway devices such as supraglottic airway devices, and a clear front-of-neck access plan must all be established before giving a muscle relaxant.[1,2] Apnoeic oxygenation may additionally be provided using nasal cannulae or high-flow nasal oxygen.[2]

Succinylcholine, a depolarizing neuromuscular blocking agent, has the fastest onset and shortest duration and has traditionally been preferred for rapid tracheal intubation. Rocuronium, when used in higher doses, also provides a rapid onset, although with a longer duration of action. Vecuronium and atracurium or cisatracurium have relatively slower onset times and intermediate durations.[3] Evidence from a Cochrane review further supports the use of neuromuscular blocking agents because avoidance of these agents was associated with a significantly increased risk of difficult tracheal intubation and upper airway discomfort or injury. [4] Sugammadex is recommended to be immediately available when rocuronium or vecuronium is used, as it can rapidly reverse profound neuromuscular blockade; neostigmine, in contrast, is slower and less reliable for reversal of deeper block.[5]

Continuous neuromuscular monitoring using train-of-four assessment, together with bispectral index monitoring and end-tidal anaesthetic concentration monitoring, is desirable to reduce the risk of awareness during paralysis, in addition to standard ASA monitoring. Adequate spontaneous ventilation, sustained head lift, and a train-of-four ratio of at least 0.9 should be ensured before extubation is attempted.[5] In failed intubation or failed oxygenation situations, failure should be declared early, repeated attempts should be limited, and help should be summoned promptly. Oxygenation should be maximized using mask ventilation or a supraglottic airway device while continuing nasal oxygen supplementation. Preparation for front-of-neck access should occur without delay, and once the airway is secured, post-crisis stabilization, detailed documentation, and team debriefing remain essential components of safe anaesthesia practice.[2,6]

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One OT, One Anaesthesiologist: A Policy Imperative

During a busy morning list, one anaesthesiologist was tasked with supervising two adjacent theatres while a stable ASA II patient was left under the immediate care of an anaesthesia technician. During the procedure, the surgeon repositioned the patient's head, inadvertently disconnecting the breathing circuit; at that moment, the technician had briefly stepped outside the operating room. Desaturation developed unnoticed until the anaesthesiologist happened to look into the theatre and saw the saturation drifting down to 88%, prompting immediate reconnection of the circuit and manual ventilation with 100% oxygen. Oxygenation rapidly normalised, and the case proceeded without adverse outcome, but the incident highlighted the risk of split supervision and unsupervised reliance on technicians.

One anaesthesiologist for one operating theatre is not excessive; it is a minimum patient-safety requirement. In 2022, a study published in *JAMA Surgery* demonstrated a 4–14% relative increase in major postoperative complications when one physician covered three to four rooms compared with one to two rooms. [1] Other studies have similarly shown that supervision lapses increase substantially as coverage expands, particularly during first-case starts and other critical portions of anaesthesia care.[2,3]

The implications are profound. When a qualified anaesthesiologist is absent from the operating theatre, even briefly, the risk of delayed recognition of hypoxaemia, airway compromise, haemodynamic collapse, drug error, or equipment failure rises sharply. Induction and emergence are especially vulnerable phases, and simultaneous inductions in multiple rooms by a single clinician create unsafe conditions. The hazard is further amplified when several short cases run in parallel. [3] A 1:1 anaesthesiologist-to-theatre ratio is therefore particularly essential in paediatric patients, emergency or poorly optimised patients, prolonged high-risk surgery, and those with ASA physical status greater than III.



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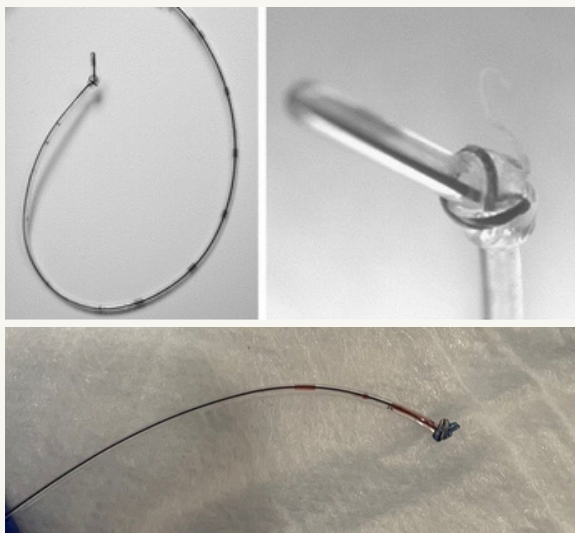
This position is strongly supported by professional and accreditation guidance. The Association of Anaesthetists standards, WHO-WFSA International Standards for a Safe Practice of Anesthesia, ISA practice guidance, and NABH COP.13(e) all reinforce continuous anaesthesiologist presence and appropriate monitored anaesthesia care as core safety expectations.[2,4-6] Continuous monitoring systems and trained assistants add an important layer of protection, but they cannot replace the vigilance, clinical judgment, and immediate intervention of an anaesthesiologist physically present in the operating theatre. Institutions should therefore adopt explicit staffing policies that guarantee one anaesthesiologist per operating theatre as a non-negotiable standard of safe perioperative care.

Beyond the Tip: Managing and Preventing Epidural Catheter Fracture

During epidural catheter removal on the first postoperative day after a caesarean section, resistance was felt as the anaesthesiologist gently pulled with the patient sitting and spine flexed. The catheter suddenly gave way, and inspection revealed only a shortened length with the distal segment missing, though the patient remained asymptomatic. The removal was stopped, the event documented and explained to the patient, and imaging plus neurosurgical consultation were arranged to localise the retained fragment and plan further management.

Epidural catheters are robust devices in routine anaesthesia practice, yet retained catheter fragments remain an uncommon but potentially challenging complication. Risk factors for catheter breakage include excessive depth of insertion, with resultant coiling or kinking, as well as damage related to patient movement or forceful manipulation of a resistant catheter. 1 When catheter breakage is suspected, all traction should be stopped immediately, and the event should be documented and disclosed to the patient. Appropriate imaging, such as MRI, CT, or fluoroscopy depending on catheter type and suspected location, should then be obtained to identify the retained fragment, and consultation with a neurosurgeon or spine surgeon should be sought. If the fragment is located in the subarachnoid space, is associated with cerebrospinal fluid leakage, carries a risk of neurological deficit or infection, or if future anticoagulation is anticipated, surgical removal may be necessary. However, when the retained fragment lies within the paravertebral or soft tissues, the patient remains asymptomatic, and there is no evidence of cerebrospinal fluid leakage, a conservative approach with regular follow-up, with Prevention remains the most important strategy.

Before insertion, the catheter should be visually inspected for manufacturing defects, sharp bends, or kinks. It should not be advanced more than 4–5 cm beyond the needle tip. After placement, the catheter should be secured with a loop and transparent adhesive dressing, and the exit site should be clearly labelled to reduce the risk of accidental traction. Repositioning should be performed with the spine flexed, and the needle and catheter should be moved together rather than independently. 2,3,4 In labouring patients, repositioning or removal should ideally be undertaken between contractions when the patient is more relaxed. 5 If resistance is encountered during removal, excessive force should never be applied. Conservative measures such as the tongue-blade technique may be attempted, and if resistance persists, sedation and fluoroscopic guidance may facilitate safe removal under direct visualization. 2,4



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Unlabelled and Unsafe: Why Syringe Labelling Saves Lives

Tranexamic acid was ordered intraoperatively for ongoing surgical bleeding, and the circulating nurse promptly drew it up and handed the syringe to the anaesthesiologist without any label. Amidst a flurry of tasks, the anaesthesiologist nearly administered it as an induction agent, having confused it with an adjacent, similarly appearing unlabelled syringe. The error was averted only when the anaesthesiologist paused to verbally reconfirm the drug.

Injectable medication administration remains a high-risk component of anaesthesia practice, with syringe misidentification recognised as a major contributor to preventable harm. The continued use of unlabelled or incompletely labeled syringes, particularly when medications are prepared outside the pharmacy or under time pressure, creates repeated opportunities for error in drug selection and dosing. In the fast-paced operating room environment, anaesthesia providers frequently manage multiple syringes of similar appearance, and reliance on memory, syringe position, or “pattern recognition” constitutes a fragile system that is highly vulnerable under stress. Cognitive overload, multitasking, and frequent interruptions further degrade recall and increase the likelihood of medication error. These failures can result in serious clinical consequences, including haemodynamic instability, intra-operative awareness, prolonged neuromuscular blockade, or even mortality, and syringe swaps or misidentification account for a substantial proportion of reported peri-operative medication incidents, with almost half of harmful events arising at the administration stage.

To address these risks, regulatory and professional bodies mandate that all medications prepared for anaesthetic use be labeled immediately with drug name and concentration, and that no syringe should leave a practitioner’s hand until appropriately labeled, encapsulated in the principle of “one drug, one syringe, one label”. Recommended strategies include the systematic use of standardised, colour-coded labels, clear separation of look-alike or sound-alike drugs, and, where available, technologies such as barcode-assisted verification and commercially prepared pre-filled syringes. However, technical solutions cannot replace professional accountability. Sustainable improvement requires a culture of safety in which labelling is non-negotiable, protocol deviations are actively discouraged, and teams are empowered to speak up when unsafe practices are observed, thereby reducing preventable medication harm and improving peri-operative outcomes.[1–3]

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Say It, Hear It, Check It: Closing the Loop on Drug Errors

During induction for an elective laparoscopic cholecystectomy, the anaesthesiologist began pre-oxygenation and noticed the patient becoming unusually drowsy despite no sedative having been administered. A rapid check of the workstation revealed the sevoflurane vaporiser still set at 4%, inadvertently left on after the machine check; the assistant later admitted seeing the dial at that setting but assumed an inhalational induction was intended and did not speak up.

Miscommunication is a major contributor to medication error in anaesthesia, where rapid decision-making, task density and team coordination are critical. Errors may occur at multiple points in the medication-use process—during verbal orders, drug preparation, intraoperative handovers or documentation—and in high-stakes environments such as the operating room, even minor lapses in information transfer can lead to administration of the wrong drug, incorrect dose or inappropriate timing, with potential for serious patient harm.[1] Verbal communication, although ubiquitous, is particularly vulnerable: background noise, similar-sounding drug names, ambiguous abbreviations and hierarchical barriers all increase the risk of misunderstanding.[1,2] For example, a hastily delivered verbal instruction without read-back confirmation significantly increases the likelihood of incorrect drug administration, while poorly structured handovers between anaesthesia providers can result in omission or duplication of medications.[2]

Human factors further compound these vulnerabilities. Fatigue, cognitive overload and time pressure may drive clinicians to rely on implicit understanding and assumptions, especially in teams that work together frequently. However, such unspoken expectations can be hazardous when team composition changes or when situational demands escalate. Addressing these risks requires structured and standardised communication strategies. Closed-loop communication, in which orders are explicitly repeated back and confirmed, has been shown to reduce errors, while the use of unambiguous drug nomenclature, avoidance of unsafe abbreviations and clear, contemporaneous documentation are essential components of safe practice.[1,3] Implementation of checklists and structured handover tools—such as the SBAR (Situation, Background, Assessment, Recommendation) format—has been associated with improved clarity and continuity of perioperative care.[3]

Ultimately, improving medication safety demands both individual vigilance and system-level interventions, including a culture that encourages open communication, flattens hierarchy and supports regular team training.[1-3]

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The Four Ts and a Ticking Clock: Managing Life-Threatening Obstetric Bleeding

During an emergency caesarean section in a woman with no antenatal diagnosis of placenta previa, a large torrential bleed occurred immediately after uterine incision and the patient rapidly progressed to pulseless collapse. Cardiopulmonary resuscitation was initiated on the table, the trachea was intubated, adrenaline given, and uncrossmatched blood rapidly transfused, with return of spontaneous circulation allowing delivery of the baby, who was transferred to the SNCU.

Catastrophic haemorrhage is a source of profound concern for both surgeons and anaesthesiologists, as it represents a form of exsanguinating blood loss that can prove fatal within minutes if not rapidly controlled. Haemorrhage is estimated to account for approximately 40% of trauma-related deaths and up to 80% of intraoperative deaths, underscoring its critical importance in perioperative care.⁽¹⁾ In obstetric practice, unexpected life-threatening bleeding during or after caesarean section is uncommon but always possible, with important causes including placenta accreta spectrum, uterine atony, caesarean scar rupture, uterine artery pseudoaneurysm and concealed postpartum haemorrhage.⁽²⁾

Postpartum haemorrhage (PPH) remains a leading cause of maternal morbidity and mortality, particularly in the setting of caesarean delivery. Massive PPH is typically defined as blood loss exceeding 2000 ml or more than 30% of the circulating blood volume.⁽³⁾ The aetiology of PPH is frequently conceptualised using the “four Ts”: uterine atony (Tone), retained placental tissue (Tissue), trauma to the genital tract (Trauma) and coagulation disorders (Thrombin).^(3,4) Management of bleeding parturients has two key components: initial resuscitation to restore circulating volume and oxygen delivery, followed by targeted treatment of the underlying cause using conservative, interventional radiological or surgical measures as appropriate.^(2,3)

Perioperative bleeding management more broadly depends on early identification of patients at increased risk, understanding the haemostatic impact of the planned procedure, ensuring timely access to blood and blood products, activating massive transfusion protocols when indicated and incorporating point-of-care coagulation testing into decision-making.^(2,3) Early recognition of catastrophic haemorrhage, coupled with a coordinated, multidisciplinary response involving obstetricians, anaesthesiologists, haematologists and critical care specialists, is essential to optimise maternal outcomes.



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Jerks, Gags and Gas: Understanding Movement During Induction

After induction with propofol, bag-mask ventilation was confirmed to be adequate and a neuromuscular blocking agent was prepared for administration. As the drug was being injected, the patient suddenly moved and forcefully withdrew her arm, dislodging the intravenous cannula. Bag-mask ventilation was maintained throughout, a new intravenous line was promptly established in the opposite arm, and tracheal intubation was subsequently completed without further complication.

General anaesthesia is a drug-induced state characterised by loss of consciousness and attenuation of protective reflexes in response to anaesthetic agents. In this state, the patient does not respond to verbal, tactile or noxious stimuli; however, involuntary movement may still occur, particularly during the transition through the early stages of anaesthesia. In 1937, Guedel described the classical stages of anaesthesia, with stage 1 representing the induction phase and stage 2 the “excitement” phase.⁽¹⁾ During stage 2, patients may exhibit limb jerks, restlessness, irregular respiration, coughing, gagging, bucking or even laryngospasm, and the risk of complications is increased because airway reflexes remain relatively intact.⁽¹⁾ Consequently, induction should be conducted smoothly and efficiently to limit the duration of stage 2 and facilitate rapid progression to stage 3, the stage of surgical anaesthesia. Laryngospasm can be minimised by ensuring an adequate depth of anaesthesia, and propofol-based induction is generally preferred because it effectively suppresses laryngeal reflexes.^(1,3)

Involuntary movement during induction may also result from other factors. Irritant volatile agents such as isoflurane or desflurane can provoke breath-holding, coughing or agitation if used for inhalational induction, whereas intravenous agents like etomidate and propofol may cause myoclonus or painful injection, which can manifest as sudden limb movements or facial grimacing in the absence of neuromuscular blockade.^(2,3) Etomidate-induced myoclonus can be attenuated by pre-treatment with benzodiazepines, opioids or dexmedetomidine, while propofol-related myoclonic activity may be reduced using a combination of low-dose ketamine and sevoflurane.^(2,3) Inhalational induction, when required, is best undertaken with non-irritant agents such as sevoflurane to improve patient comfort and reduce airway reactivity.^(2,3) Recognising the physiological basis of movement during induction and applying appropriate prophylactic strategies enables clinicians to improve patient safety, airway control and operating conditions.



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Transfer at a Cost: When Moving the Critically Ill Becomes a Critical Incident

During transfer of a haemodynamically compromised post-cardiac surgery patient for planned re-exploration, the intra-aortic balloon catheter was accidentally dislodged after the tubing became entrapped beneath a bed wheel, causing uncontrolled arterial haemorrhage and a fifteen-minute interruption of circulatory support. Catheter reinsertion was accomplished, but persistent bleeding raised concern for an arterial wall injury attributable to balloon trauma, managed with continuous manual compression for the duration of surgery.



The transfer of critically ill patients is an essential component of modern medical care. It is imperative to adopt standardised checklists to mitigate adverse events during this process. [1,2]

Studies conducted as recently as 2022 have identified significant deficiencies in intra-hospital patient transfer procedures. These included failure to recheck patients' identification, vital parameters, and various lines and tubes before and after transport.[2,3]

In critically ill cardiac patients, the use of mechanical circulatory support devices adds considerable complexity to the transfer process. Personnel responsible for transferring such patients must be adequately trained to secure, manage, and troubleshoot these devices. [1]

The adoption or formulation of standardised transfer protocols, alongside repeated audits to ensure adherence, could prevent accidental disconnections and device malfunctions. [1,3]

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Wrong Drug, Wrong Route, Wrong Outcome: Breaking the Cycle of Medication Errors in Anaesthesia.

A systemic analgesic prescribing concern was identified at a busy orthopaedic unit, where 1g intravenous paracetamol was routinely administered intraoperatively regardless of anaesthetic modality or patient weight, with repeat doses of equivalent magnitude administered in the recovery unit and ward within two hours of the last intraoperative dose. The absence of weight-based dosing criteria and minimum inter-dose interval enforcement constituted a recurring risk of inadvertent paracetamol overdose across the patient population.

Medication errors remain a significant source of preventable harm in anaesthetic practice. Wrong-route errors — such as inadvertent epidural administration of intravascular agents — can cause catastrophic outcomes. Drug administration to the wrong patient frequently stems from inadequate pre-procedure identification checks. Wrong-dose errors arise from calculation mistakes, unfamiliarity with paediatric dosing, or failure to account for patient weight and co-morbidities. Unlabelled or poorly labelled syringes represent a persistent hazard, particularly during high-pressure intra-operative scenarios. (1,2,4) Merry et al have also found that drug administration errors were significantly reduced when the anaesthesiologists used a barcode reader with a voice prompt. (1)

Prevention requires a multi-layered approach. The WHO Surgical Safety Checklist and standardised pre-induction drug verification protocols are foundational.(3) All syringes must be labelled immediately upon preparation using colour-coded, internationally standardised labels. (2) Prefilled, commercially prepared syringes reduce preparation errors. Independent double-checking of high-risk drugs (e.g., neuromuscular blocking agents, concentrated electrolytes) is strongly recommended.(1)Non-Luer connectors for neuraxial and enteral routes physically prevent wrong-route errors. (2) Staff education, fatigue management, and a non-punitive reporting culture further support safe practice.(4)

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Beyond the Mask: Deficiency in Anaesthesia Service and the Doctrine of Vicarious Liability

In a resource-constrained operative environment, institutional and surgical pressure compelled the sole on-duty anaesthesiologist to administer spinal anaesthesia for an elective caesarean section while simultaneously managing an unresolved postpartum haemorrhage, leaving the newly anaesthetised patient under unsupervised technician care. Consequent failure to recognise and treat spinal-induced hypotension resulted in cardiac arrest complicated by ventricular tachycardia, which was managed with cardiopulmonary resuscitation, defibrillation, and inotropic support.

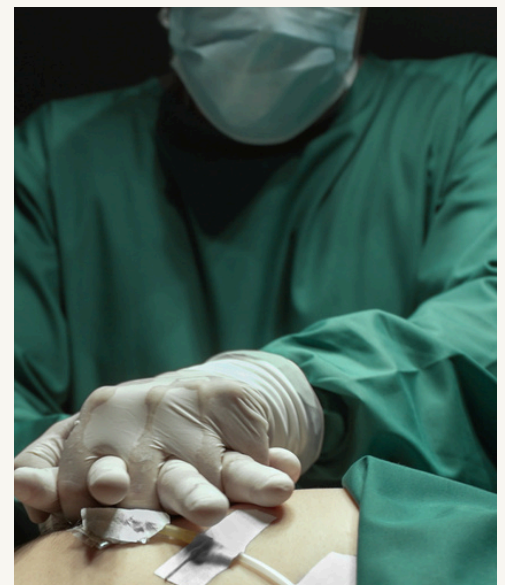
While the integration of qualified anaesthesia technicians has materially enhanced the efficiency of perioperative care, it does not attenuate the anaesthesiologist's professional accountability. The supervising anaesthesiologist remains vicariously liable for any adverse event arising in the course of service delivery. The Indian Society of Anaesthesiologists' Guidelines for Practising Anaesthesiologists in India explicitly mandates, as a minimum standard, the continuous presence of a qualified and registered anaesthesiologist in any operating room in which a patient is undergoing a procedure under anaesthesia. Non-compliance with this standard renders the anaesthesiologist, the operating surgeon, and the institution jointly susceptible to liability under the doctrine of vicarious liability — each being accountable, in varying measure, for the conduct of those operating within their clinical authority. (1)

In cases involving cardiac arrest or the omission of pre-anaesthetic evaluation, the evidentiary principle of *res ipsa loquitur* applies, inverting the burden of proof such that it falls upon the treating clinician to rebut the inference of negligence.

In an increasingly litigious medico-legal environment, it is incumbent upon anaesthesiologists to cultivate a rigorous understanding of deficiency in service, vicarious liability, and the allocation of the burden of proof. (2)

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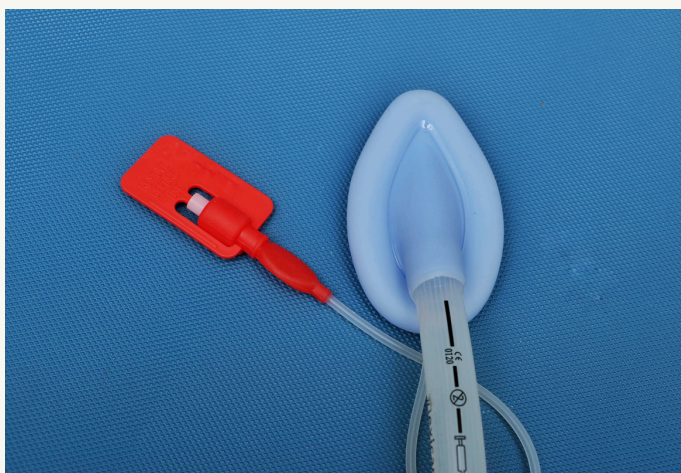
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Under Pressure: Why LMA Cuff Monitoring Cannot Be an Afterthought

Following elective RIRS under general anaesthesia using a ProSeal LMA, a patient developed post-operative tongue swelling and pharyngeal discomfort, prompting retrospective file review which uncovered a prior undisclosed episode of laryngeal oedema after anaesthesia for an identical procedure. The patient subsequently required admission to a tertiary ENT unit, where the condition was attributed to aphthous ulceration.

The laryngeal mask airway (LMA) — comprising a ventilation tube coupled to an inflatable elliptical cuff — provides a seal around the laryngeal inlet for airway maintenance under general anaesthesia and serves as a critical rescue device in the difficult airway. A substantial body of evidence implicates excessive intracuff pressure in direct mucosal ischaemia and inflammation, with consequent postoperative pharyngolaryngeal morbidity. Dr Archie Brain, the LMA's progenitor, established 60 cmH₂O as the upper safe limit for intracuff pressure. Pressure assessment may be subjective — digital palpation of the pilot balloon, an acknowledged imprecise surrogate — or objective, employing a manometer, pressure transducer, or intrinsic syringe recoil. Optimal management requires direct pressure measurement and iterative cuff volume adjustment to sustain values within the recommended range.



The clinical imperative for such vigilance is unambiguous. Seet and colleagues demonstrated a reduction in pharyngo-laryngeal complications from 46% to 13% upon prospective limitation of cuff pressure to 60 cmH₂O. Continuous intra-cuff pressure monitoring thus exerts a measurable and clinically meaningful impact on the key takeaways for clinical practice incidence and severity of postoperative airway complications, warranting its adoption as a routine standard of LMA-based anaesthetic practice.

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Left Behind: The WHO Sign-Out Checklist and the Silent Danger of the Retained Throat Pack

A breakdown in intraoperative communication between the anaesthetic and surgical teams resulted in the undocumented insertion of two throat packs, only one of which was retrieved prior to extubation. The second pack was subsequently coughed out by the patient post-extubation, constituting a significant retained foreign body incident

Surgical intervention, while life-preserving, carries an inherent risk of preventable perioperative morbidity. The WHO Safe Surgery Saves Lives initiative (2007) and its 19-item Surgical Safety Checklist (2009) were conceived to address this risk systematically. Critically, 43% of adverse intra-operative events are attributable to failures in standard care — failures the checklist is specifically designed to intercept.¹

The checklist encompasses three perioperative time points: Sign In, Time Out, and Sign Out. The Sign Out — completed before the patient leaves the theatre — holds particular salience for the anaesthesiologist. It mandates confirmation that swab and instrument counts are correct, providing the final structured opportunity to verify removal of the throat pack: a pharyngeal gauze inserted to protect the airway during oropharyngeal procedures.

A retained throat pack is a potentially fatal oversight. Upon extubation, an undetected pack may precipitate acute airway obstruction, hypoxia, and cardiac arrest. Meta-analyses confirms that adherence to the structured checklist reduces postoperative complications and mortality.^{2,3} In this context, the Sign Out is not a bureaucratic formality — it is the anaesthesiologist's last line of defence.



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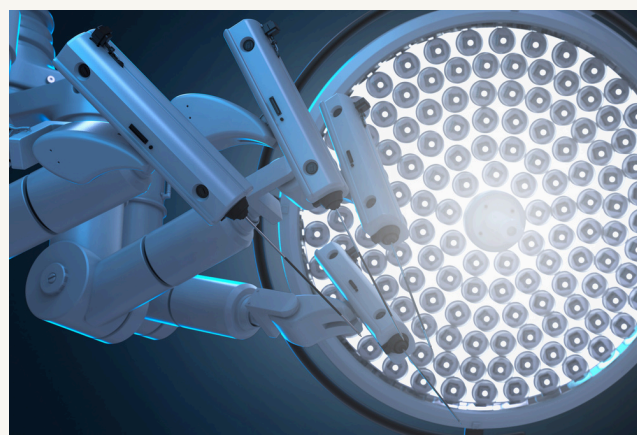
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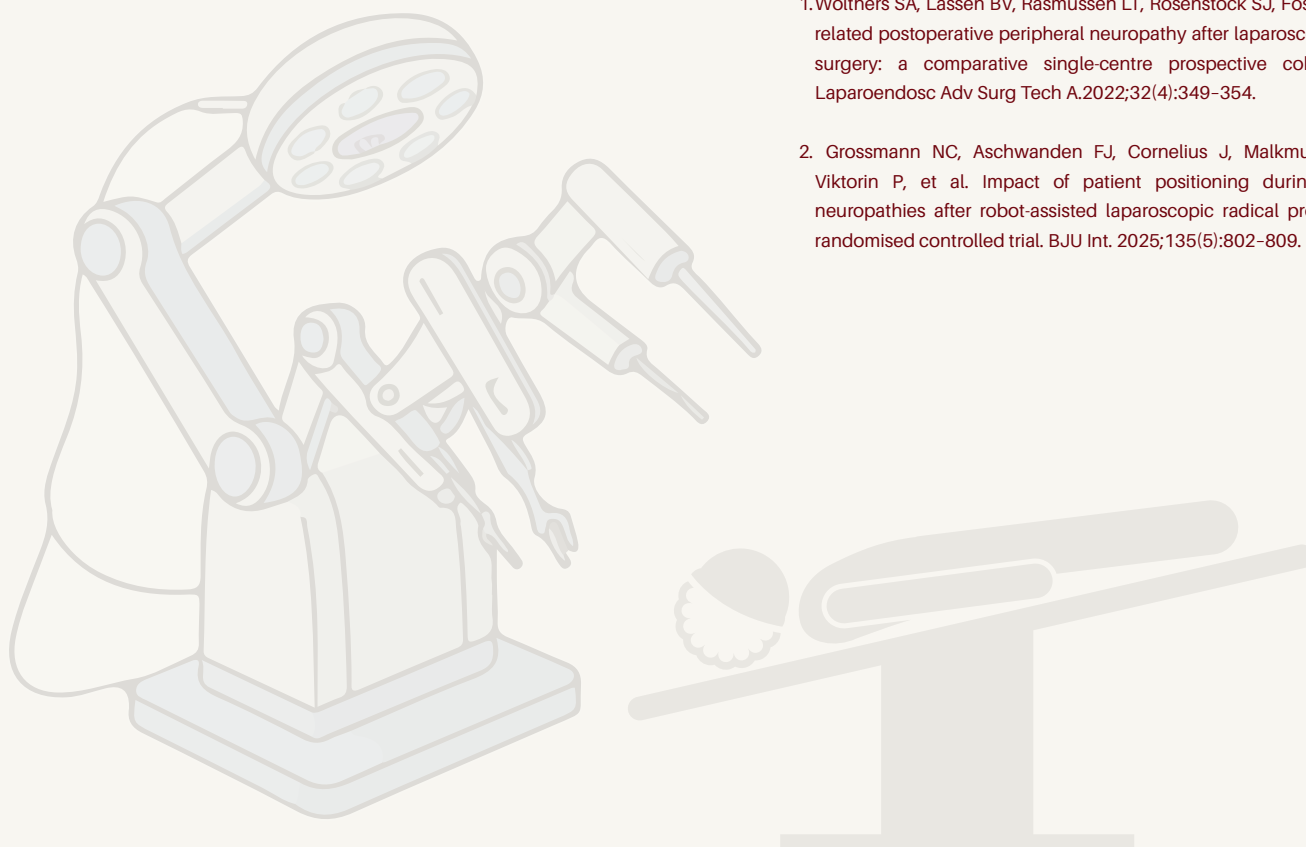
Heads Down, Nerves at Risk: Positioning-Related Shoulder Dysfunction in Prolonged Trendelenburg

Development of skin excoriation, shoulder dysfunction and pain following head low position more than 6 hours for robotic abdominoperineal resection

Prolonged steep Trendelenburg positioning is associated with shoulder girdle dysfunction, attributable to stretch-induced injury of the brachial plexus or direct compressive trauma to the supraspinatus and deltoid musculature, clinically manifesting as weakness in shoulder abduction.⁽¹⁾ Mechanical restraints employed to prevent caudal patient migration — including shoulder braces — may further exacerbate neuromuscular compromise through sustained focal pressure on vulnerable muscular and neural structures.^(1,2)



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Prophylaxis or Peril: The Double-Edged Risk of Perioperative Antibiotic Administration

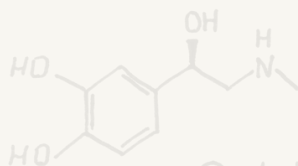
A recurring pattern of perioperative haemodynamic instability coinciding with antibiotic administration was identified across two cases, with one episode complicated by the simultaneous administration of a thoracic epidural top-up in a patient on telmisartan for hypertension undergoing major upper abdominal surgery under general anaesthesia. The temporal convergence of epidural sympathetic blockade, antihypertensive medication, and potential antibiotic-induced anaphylaxis rendered definitive attribution difficult, underscoring the importance of staggered drug administration and heightened vigilance during the induction period.

Perioperative antibiotic prophylaxis, whilst indispensable in surgical infection prevention, carries an inherent risk of hypersensitivity reactions ranging from mild cutaneous manifestations to life-threatening anaphylaxis, mandating continuous vigilance throughout the administration period.⁽¹⁾ Intradermal skin testing prior to antibiotic administration cannot reliably exclude adverse reactions upon subsequent full intravenous dosing, and slow continuous infusion is therefore preferred over bolus delivery to facilitate early detection of evolving hypersensitivity.⁽¹⁾ Effective management is contingent upon prompt recognition of the event, timely institution of supportive therapy, and judicious use of adrenaline and vasoactive agents. Furthermore, administration of antibiotic prophylaxis a minimum of fifteen minutes prior to induction of anaesthesia is strongly advocated to mitigate the compounding haemodynamic consequences of concurrent anaesthetic agents.⁽²⁾

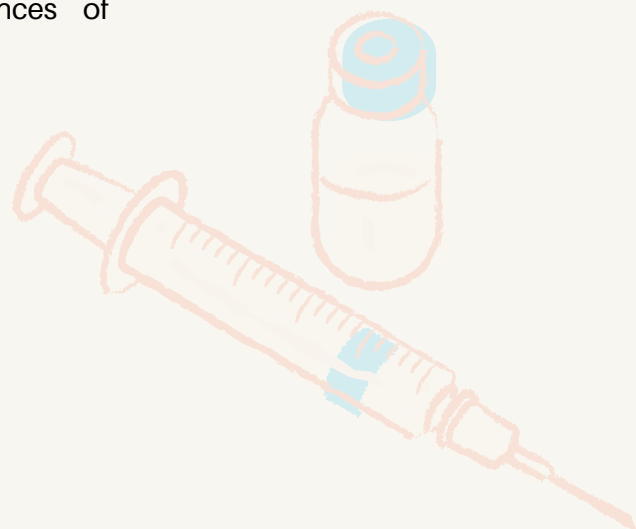


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Adrenaline



$C_9H_{13}NO_3$



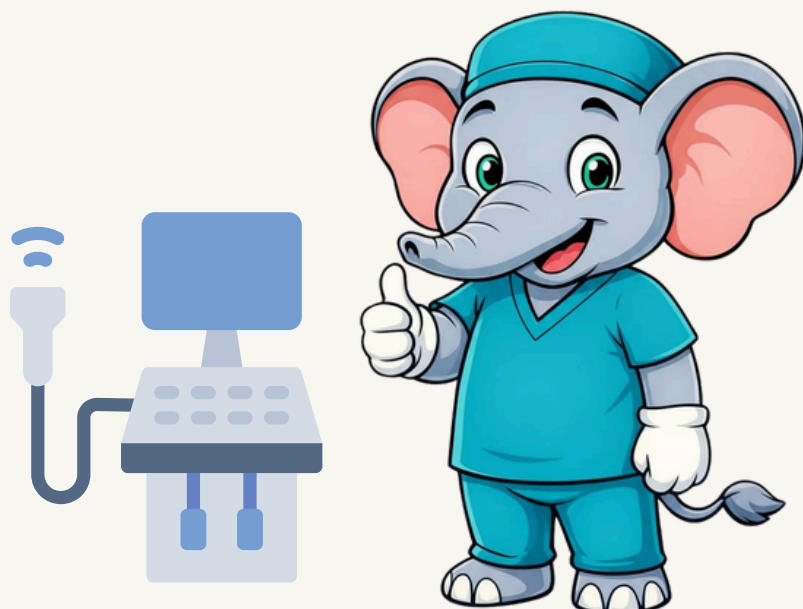
Beneath the Surface: Vascular Anomalies and the Hazards of Central Venous Cannulation

Central venous cannulation in a patient with hepatic cirrhosis and portal hypertension was complicated by inadvertent puncture of anomalously engorged cervical vessels, resulting in haemothorax, a complication potentiated by the distorted vascular anatomy characteristic of advanced portal hypertension. A concurrent incident of subclavian arterial puncture during internal jugular vein cannulation, consequent upon excessive lateral needle trajectory, further underscored the heightened procedural hazard inherent to central venous access in patients with cirrhotic vasculopathy.

Patients with congenital or acquired vascular abnormalities are at substantially elevated risk of haematoma formation and vascular injury during invasive procedures, with central venous cannulation representing a particularly hazardous intervention in this cohort. Pre-procedural ultrasonographic assessment of the intended cannulation site is strongly advocated, as real-time imaging affords delineation of aberrant or engorged vascular structures, thereby enabling a more informed and cautious procedural approach.^(1,2)

Particular circumspection is warranted during the dilation step of catheter insertion; dilatation must be performed with deliberate, controlled force to preclude mechanical injury to adjacent vascular and thoracic structures.⁽³⁾

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Warming the Patient, Burning the Trust: Iatrogenic Thermal Injury from Improvised Intraoperative Warming Devices

An improvised warming device comprising a water-filled glove was employed to manage intraoperative hypothermia in a critically ill patient undergoing emergency laparotomy for bowel perforation with septic shock, in the absence of a validated active warming modality. Unattended application of the device during a period of competing clinical demands resulted in contact thermal injury at the site of application, constituting a preventable iatrogenic burn in an already haemodynamically compromised patient.

In resource-constrained surgical environments, improvised warming techniques are frequently employed as pragmatic alternatives to validated thermoregulatory devices to mitigate intraoperative hypothermia; however, such practices carry a substantive risk of iatrogenic thermal injury.⁽¹⁾ Water-filled gloves, in particular, are associated with localised thermal concentration and progressive temperature elevation at the contact interface, with the risk of burn injury compounded significantly by prolonged and unsupervised application.⁽²⁾

The use of approved, evidence-based intraoperative warming devices is strongly advocated wherever resources permit. Where improvised alternatives are unavoidable, effective interprofessional communication is paramount. Pertinent clinical information regarding active warming interventions must be conveyed explicitly, whether through written documentation at the point of care or via direct verbal handover to the relieving anaesthesiologist or theatre technician, to ensure uninterrupted vigilance and patient safety.



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Depth, Pressure and Vigilance: Airway Catastrophes, Emergence Complications and Irrigation Fluid Dynamics in Anaesthetic Practice

Negative pressure pulmonary oedema arose as a direct consequence of endotracheal tube occlusion secondary to patient biting during the emergence phase of general anaesthesia, representing a preventable post-extubation respiratory complication

Intraoperative oxygen desaturation was observed in a paediatric patient immediately following penile block administration under general anaesthesia, occurring concurrently with the commencement of surgical stimulation and necessitating prompt haemodynamic assessment to exclude local anaesthetic systemic toxicity.

Intraoperative development of raised peak airway pressure, respiratory acidosis, conjunctival oedema, and coarse pulmonary crepitations during endoscopic spine surgery was consistent with significant irrigation fluid absorption and consequent acute fluid overload.

Inadequate depth of anaesthesia predisposes to intraoperative airway instability; unopposed airway collapse under conditions of insufficient anaesthetic depth may culminate in negative pressure pulmonary oedema if not promptly recognised and managed. (1,2) Premature surgical stimulation before attainment of adequate anaesthetic depth constitutes a recognised precipitant of laryngospasm and consequent oxygen desaturation,(1) whilst even seemingly innocuous events — such as endotracheal tube occlusion secondary to patient biting during emergence — are capable of generating sufficient negative intrathoracic pressure to precipitate pulmonary oedema.(2) Prophylactic placement of a bite block, optimally positioned between the molar teeth, is a simple yet effective measure to preclude endotracheal tube compression, and it remains a cardinal principle of safe anaesthetic practice to extubate patients either in a fully awake state with intact protective reflexes or under sufficiently deep anaesthetic planes to obtund airway reactivity.(1,2) Equally, vigilant monitoring of irrigation fluid balance is imperative during endoscopic spinal procedures; whilst systemic fluid absorption is comparatively lower than that observed in transurethral resection of the prostate, the risk remains clinically significant, particularly during endoscopic discectomy.(3,4)

Operative irrigation pressures should be maintained at the minimum level requisite for adequate visualisation, with published data suggesting working pressures in the range of 4.4– 31 cmH₂O, pressures exceeding this threshold being associated with headache, cervical pain, and autonomic disturbance.(3,4,5) Ensuring unobstructed irrigant outflow, minimising operative duration, and employing refined endoscopic surgical technique collectively mitigate the volume of systemic fluid absorption and its attendant complications.(6)

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ONE WRONG AMPOULE AWAY — EVOKES THE THIN MARGIN OF ERROR

During an emergency lower segment caesarean section performed at night, neostigmine was inadvertently prepared in place of bupivacaine for spinal anaesthesia and administered without pre-injection verification. Absence of the expected spinal block prompted review, at which point the incorrect ampoule was identified. Unsupervised nursing drug preparation and the absence of an independent double-check at the point of administration were the principal contributing factors.

An error is a failure to execute an intended action correctly. A medication error is any error in the medication process, whether or not it results in patient harm. James Reason classifies human errors into slips, lapses, and mistakes — each reflecting a distinct failure in cognitive processing. In anaesthesia practice, drug errors can be life-threatening. Man, machine, medicine, and modus operandi are the principal contributory factors. The Institute of Medicine (IOM) reported that 44,000–98,000 patients die annually as a result of medical errors, a substantial proportion being medication-related. (1) These figures represent only the tip of the iceberg, as many incidents go unreported owing to fear of punitive action, absence of structured reporting systems, and underrecognition of near-miss events.

Jensen et al. described several strategies to prevent drug errors in the operating room. All syringes must be labelled immediately upon preparation. The label of every drug ampule or syringe should be carefully verified before drawing up and again before administration. Look-alike ampules and high-alert medications must be physically separated on the anaesthesia trolley. The anaesthesia provider who administers the drug should be the one who draws it up and labels the syringe.(2)

The five rights framework — right drug, right patient, right dose, right time, and right route — remains the foundational standard for safe drug administration and must be verified at every point of delivery.(3) Universal adoption of these practices is imperative to reduce preventable medication harm across all anaesthetic settings.

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IDENTICAL PACKAGING, FATAL CONSEQUENCES — HIGHLIGHTS THE SYSTEMIC FLAW

During spinal anaesthesia for an obstetric procedure, a wrong drug was administered intrathecally. Ampule similarity was identified as a primary contributing factor, with both preparation and administration steps lacking independent verification. Serious cardioneurological consequences followed. The absence of mandatory double-checking before neuraxial injection and the near-identical appearance of drug containers on the spinal trolley were the principal system failures identified.

Inadvertent intrathecal injection of an unintended drug is among the most serious complications in anaesthetic practice. Reported cases involving tranexamic acid, atracurium, potassium chloride, neostigmine, and various antibiotics illustrate the potentially catastrophic cardioneurological consequences — including refractory seizures, cardiovascular collapse, and death. No standardised management guidelines currently exist, reflecting both the rarity and the heterogeneity of these events.(1)

Root cause analyses consistently identify two principal contributing factors: human error at the point of preparation or administration, and physical similarity between drug containers. Drugs housed in near-identical ampules or vials stored in proximity on the neuraxial tray create conditions for inadvertent substitution — a phenomenon termed syringe swap when pre-drawn syringes are involved. The psychological toll on practitioners involved in such incidents should not be overlooked; in addition to potential regulatory consequences, these events can cause lasting professional and personal distress.(2,3)

Preventive strategies are well-described and readily implementable. Prefilled, single-blister-packed spinal drug units and dual-sterile-envelope packaging for local anaesthetics have been proposed to reduce handling errors.(1) At the institutional level, strict physical separation of look-alike containers, standardised and clearly labelled neuraxial trays, mandatory independent double-checking before any intrathecal injection, and systematic verbal verification as part of the spinal checklist are all effective, low-cost measures that merit universal adoption. (4)

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STOP AND DOUBLE-CHECK

COUNTED OUT, LEFT IN: RETAINED SURGICAL ITEMS

During a total gastrectomy performed under general anaesthesia with a combined neuraxial technique, a gauze piece was retained intraabdominally. Abdominal closure was completed before the surgical gauze count was finalised, and the WHO Surgical Safety Checklist Sign-Out was not completed prior to closure.

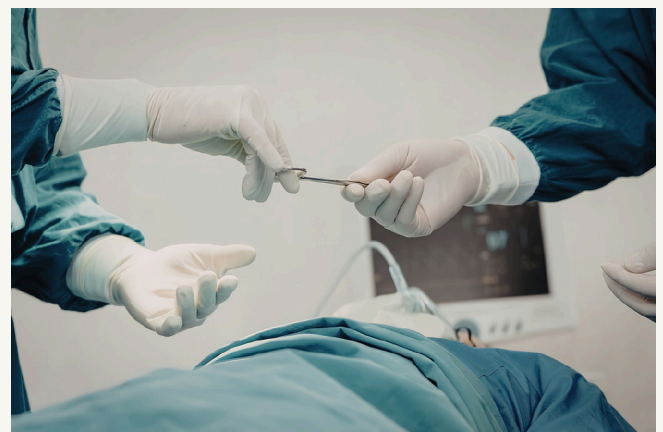
Retained surgical items (RSIs), particularly abdominal packs (gossypiboma), are preventable 'never events' associated with significant morbidity, reoperation, and medicolegal consequences.[1] Although traditionally regarded as a surgical responsibility, the anaesthesiologist plays a vital complementary role in prevention through sustained vigilance, effective communication, and disciplined adherence to safety protocols.

The risk of RSIs is heightened during emergency surgeries, unplanned procedural changes, obesity, and major haemorrhage.[1][2] As a constant intraoperative presence, the anaesthesiologist is uniquely positioned to recognise these high-risk scenarios and reinforce the importance of accurate surgical counts. Active participation in the WHO Surgical Safety Checklist — including the Time Out and Sign Out stages — ensures that sponge and instrument counts are audibly confirmed before wound closure.[3]

Anaesthesiologists also directly manage countable items such as throat packs, which must follow strict insertion and removal tracking protocols.[5] In damage-control surgeries where packs may be intentionally retained, meticulous documentation, unambiguous communication, and structured handover during transitions of care are essential safeguards. Communication failures remain a leading contributor to adverse surgical events, underscoring the anaesthesiologist's critical role in maintaining team situational awareness.[6]

When a count discrepancy arises, the anaesthesiologist must ensure haemodynamic stability during radiographic evaluation and advocate for thorough investigation before closure proceeds. Prevention of retained surgical items is ultimately a shared team responsibility, with the anaesthesiologist serving as an indispensable safeguard through vigilance, communication, and collaborative

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HEAD DOWN AND BREATHLESS: THE HIDDEN RISK OF STEEP TILT

During laparoscopic surgery with steep Trendelenburg positioning, pneumothorax developed intraoperatively. Rising airway pressures were initially attributed to the effects of positioning and pneumoperitoneum, which delayed recognition. Haemodynamic compromise subsequently developed. Diagnostic anchoring to a positional aetiology and delayed exclusion of barotrauma were identified as key contributing factors.

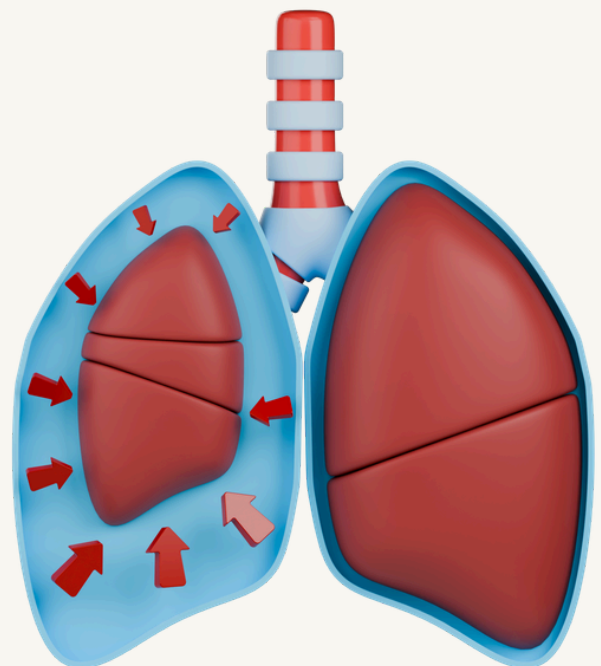
Pneumothorax during Trendelenburg positioning is a rare but potentially life-threatening complication, encountered primarily during laparoscopic and robotic surgeries.[1] The combination of steep head-down tilt and carbon dioxide (CO₂) pneumoperitoneum imposes significant physiological stress — the diaphragm is displaced cephalad, functional residual capacity is reduced, and peak airway pressures required for adequate ventilation are substantially elevated.[2,3]

Two principal pathways contribute to this complication:

Barotrauma due to elevated inspiratory pressures can cause alveolar rupture, with air tracking along the bronchovascular sheath into the mediastinum and subsequently the pleural space.[2,4] Capnothorax: CO₂ may enter the pleural cavity through congenital diaphragmatic defects, such as those at the oesophageal hiatus, or through iatrogenic breaches during surgery.[1,2]

The Trendelenburg position, frequently adopted for internal jugular vein cannulation, may additionally bring the lung cupola closer to the needle trajectory, increasing the risk of direct pleural puncture.[2]

Early recognition is critical, heralded by a sudden rise in airway pressures, unexplained hypoxia, or haemodynamic instability.[1,3] Key preventive strategies include, lung-protective ventilation: Low tidal volumes and limited peak inspiratory pressures to mitigate barotrauma, [3,4] Maintaining the minimum effective pneumoperitoneum pressure and reducing the degree of head-down tilt wherever clinically feasible[1,5] and real-time imaging for all central venous access to minimise the risk of accidental pleural injury.[2]



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UP TOO SOON, DOWN TOO FAST: THE HIDDEN RISKS OF EARLY MOBILISATION

Following a prolonged head and neck surgery with free flap reconstruction, an acute cerebral infarction was identified on postoperative day 1. The intraoperative course was documented as uneventful, with no recorded episodes of hypotension. No intraoperative precipitant was identified.

Early postoperative mobilisation is a cornerstone of enhanced recovery after surgery (ERAS) protocols, with well-established benefits including reduced venous thromboembolism, fewer pulmonary complications, decreased incidence of delirium, and shorter hospital stay. However, the risks associated with early ambulation remain underappreciated and demand structured perioperative planning. Potential complications include patient falls, orthostatic hypotension, haemodynamic instability, and inadvertent dislodgement of intravenous lines, urinary catheters, surgical drains, or monitoring devices.

Several factors may compromise the safety of early ambulation. Residual effects of sedatives, opioids, and neuromuscular blocking agents impair both motor coordination and cognitive function in the immediate postoperative period. Fluid shifts, surgical blood loss, and concurrent vasodilatory medications contribute to postural hypotension. Postoperative delirium, particularly prevalent in elderly patients, further amplifies fall risk. The presence of multiple indwelling devices restricts mobility and heightens the likelihood of accidental dislodgement during initial mobilisation attempts.

The anaesthesiologist's contribution to safe mobilisation extends across the entire perioperative continuum. Preoperative assessment should incorporate validated frailty scoring, nutritional evaluation, cognitive screening, and baseline functional capacity. Intraoperatively, avoidance of long-acting sedatives, complete reversal of neuromuscular blockade confirmed by quantitative monitoring, opioid-sparing regional techniques, multimodal analgesia, and goal-directed fluid therapy collectively facilitate earlier and safer functional recovery. Safe early mobilisation ultimately depends on a coordinated, multidisciplinary approach involving anaesthesiologists, surgeons, nursing staff, and physiotherapists, underpinned by clear communication and structured handover across all points of care transition.



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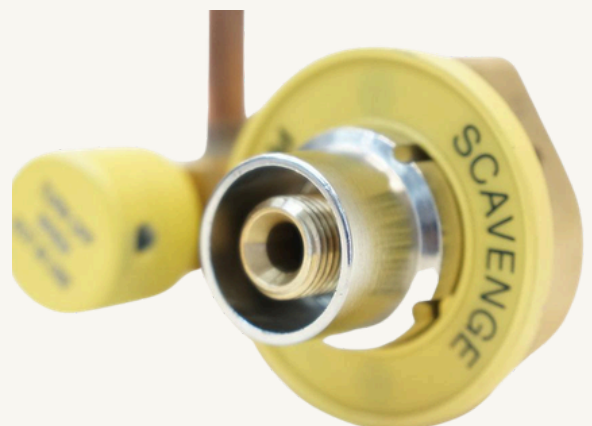
OPEN VALVE, SILENT FAILURE: HOW A SMALL OVERSIGHT COMPROMISES VENTILATION

During elective orthopaedic surgery, the anaesthesia machine was replaced intraoperatively as the airway pressure was not receding below 10 cmH₂O with APL valve set at minimum. The scavenging system was subsequently identified as faulty and corrected promptly, averting ventilation compromise.

The adjustable pressure limiting (APL) valve is a critical safety component of the anaesthesia breathing circuit, regulating circuit pressure during manual and spontaneous ventilation. Despite widespread adoption of automated pre-anaesthesia machine checks, APL valve dysfunction continues to be reported and carries the potential for unrecognised ventilation failure with serious patient consequences.

Several distinct failure mechanisms have been described. Extrinsic obstruction — including entrapment of capnography sampling lines, temperature probe cables, or monitoring leads between the APL control knob and valve base — can prevent complete valve closure during manual ventilation. Physical deterioration of internal valve components, such as cracks in the valve body or degradation of O-rings and valve seats, may cause uncontrolled pressure loss and failure to sustain circuit pressures. The APL valve may also be inadvertently left fully open or incorrectly configured owing to unfamiliarity with a particular machine design, leading to complete manual ventilation failure.

Any unexpected difficulty in transitioning from mechanical to manual ventilation should prompt immediate inspection of the APL valve alongside a systematic circuit leak assessment. Monitoring lines and cables must be routinely routed clear of the APL valve assembly. Automated machine checks must never be regarded as a substitute for hands-on functional verification. The traditional pre-use check — occluding the Y-piece, closing the APL valve, compressing the reservoir bag, and confirming both a pressure rise and an audible release on valve opening — remains a simple, reliable, and indispensable safeguard that must precede every anaesthetic. The check should include the scavenging system too.



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FORGOTTEN BUT NOT FORGIVEN: THE TOURNIQUET THAT STAYED BEHIND

A tourniquet applied for peripheral intravenous cannulation in the operating theatre was not removed following successful venous access. The cannulated limb was subsequently positioned beneath surgical drapes, obscuring the tourniquet from view. The error was identified during intraoperative assessment of the covered limb, and timely recognition averted ischaemic sequelae.

A tourniquet inadvertently left in place following intravenous cannulation is a preventable procedural error with potentially serious consequences. Prolonged venous occlusion causes progressive distal congestion, manifesting initially as pain, oedema, and vascular engorgement. If constriction persists, arterial inflow may be compromised, progressing to nerve injury, compartment syndrome, venous thrombosis, tissue necrosis, and potentially irreversible limb damage.[1] Systemic complications, including rhabdomyolysis and acute kidney injury, have been reported. Retained tourniquets are formally classified as 'never events,' reflecting a fundamental lapse in procedural vigilance.

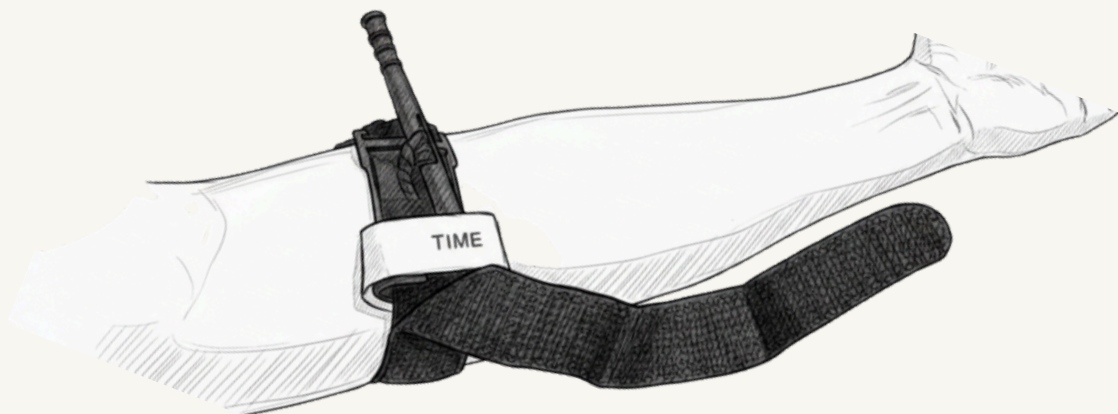
Several contributing factors predispose to this error: poor tourniquet visibility due to colour, size, or concealment beneath surgical drapes; clinician distraction during high-workload phases; communication gaps between team members; cannulation at non-standard access sites; use of improvised tourniquet substitutes; and inadequate ambient lighting.[2] In the operating theatre, the risk is substantially heightened when a cannulated limb is positioned and draped before the tourniquet has been removed.

Prevention demands both individual accountability and robust system-level safeguards. The tourniquet must be released immediately upon successful venous access and before the cannula is secured. Use of brightly coloured, visually conspicuous tourniquets improves detection under drapes and dim lighting. Incorporating a mandatory 'tourniquet removed' confirmation step within standardised IV insertion checklists provides a dependable structural safeguard. Verbal closed-loop confirmation between team members and active engagement of conscious patients to report persistent tightness or discomfort offer additional layers of protection.[3] Consistent application of these measures can effectively eliminate this category of preventable harm.

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2. Taylor MA, Mattox EA. Beware of the Forgotten Tourniquet During Phlebotomy and IV Insertion. Patient Safety. 2025;7(2). doi:10.33940/001c.128211

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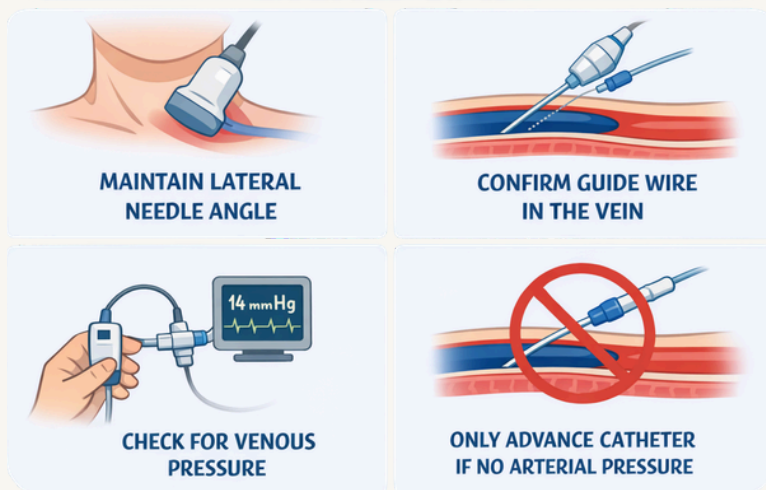
SEEING THE VEIN, HITTING THE ARTERY: WHEN ULTRASOUND GUIDANCE FALLS SHORT

During central venous catheterisation of the left internal jugular vein in a renal transplant recipient, the carotid artery was inadvertently punctured by a senior resident under ultrasound guidance. The needle is believed to have shifted from the vein to the carotid artery during guide wire placement. A dilator and catheter were advanced before arterial placement was recognised, and a large haematoma developed on removal. Medial needle angulation and guide wire advancement without arterial pressure confirmation were identified as the key technical contributors.

Ultrasound guidance for central venous catheterisation has markedly improved procedural safety, reducing the number of insertion attempts, time to cannulation, and associated complications. However, ultrasound does not eliminate the risk of inadvertent arterial injury. Carotid artery puncture remains a recognised complication even under direct real-time imaging, and advancement of a dilator or large-bore catheter into the carotid can result in catastrophic consequences — including stroke, major haemorrhage, pseudoaneurysm, and arteriovenous fistula. [1]

Two principal ultrasound approaches are employed. The short-axis (out-of-plane) view permits simultaneous visualisation of the carotid artery and internal jugular vein, aiding assessment of their anatomical relationship, but provides limited continuous tracking of the advancing needle tip. The long-axis (in-plane) view enables continuous visualisation of the full needle shaft and tip, enhancing procedural precision; however, simultaneous arterial and venous imaging is not possible, necessitating accurate pre-cannulation vessel identification.

Tips to Prevent Carotid Artery Cannulation During Central Line Placement



Evidence suggests the long-axis approach is associated with fewer needle redirections, shorter cannulation time, and a lower incidence of posterior wall punctures.[2] Regardless of the approach chosen, continuous needle tip visualisation must be maintained throughout the procedure. Medial needle angulation during cannulation or guide wire advancement is a well-recognised risk factor for carotid injury and must be actively avoided — the needle should be directed perpendicular to, or laterally away from, the artery. Ultrasound guidance must complement, never replace, sound anatomical knowledge and disciplined procedural technique. [3]

1. Kumar N, et al. Incidence of posterior vessel wall puncture during ultrasound guided vascular access: Short axis versus long axis approach. J Anaesthesiol Clin Pharmacol. 2021;37(3):342–346.
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3. Papastratigakis G, et al. Management of Inadvertent Arterial Catheterization during Central Venous Catheter Placement. J Pers Med. 2022;12(9):1537.

Anaesthesia machine pre-use checklist audit: Are we truly compliant?

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“ Checks prevent most failures, audits ensure safety. ”

Introduction

The anaesthesia workstation is a life-support system, not merely an item of equipment. It delivers oxygen and anaesthetic gases, enables ventilation, removes carbon dioxide, integrates alarms and monitoring, and connects with suction, power, backup gas and scavenging systems. Its reliability, however, continues to depend on a human safety behaviour: the pre-use check. The WHO Surgical Safety Checklist asks before induction whether the anaesthesia machine and medication check are complete, and the WHO-WFSA International Standards place safe equipment, monitoring and checklist use among the foundations of safe anaesthesia care.^{1,2}

For APSA, the relevant question is therefore not whether a checklist exists, but whether it is consistently performed, documented and acted upon. A tick mark without verification gives false reassurance; a completed check can prevent hypoxic gas delivery, failed ventilation, inability to suction, unrecognised monitor failure and occupational exposure to waste anaesthetic gases.

RECOMMENDED



Daily checks, checks after movement or vaporizer change, and shorter checks before each case

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Why audit the pre-use check?

Equipment-related disasters are uncommon, but they are often severe and preventable. In an ASA Closed Claims update on gas delivery equipment, 85% of claims involved provider error with or without equipment failure, and 35% were considered preventable by a pre-anaesthesia machine check.⁶ The 2008 APSF/ASA checkout recommendations were developed because older checklists did not fit modern workstations. They recommend daily checks, checks after movement or vaporizer change, and shorter checks before each case, while acknowledging that automated self-tests do not cover every clinically important component.³ The Association of Anaesthetists similarly emphasises that anaesthetists must understand equipment, be trained to use it and check it before use, with recording and audits as part of safe practice.⁴

1. World Health Organization. WHO guidelines for safe surgery 2009: safe surgery saves lives. Geneva: World Health Organization; 2009.
2. Gelb AW, Morriss WW, Johnson W, Merry AF; International Standards for a Safe Practice of Anesthesia Workgroup. World Health Organization-World Federation of Societies of Anaesthesiologists International Standards for a Safe Practice of Anesthesia. *Can J Anaesth*. 2018;65(6):698-708.
3. Feldman JM. New guidelines available for pre-anesthesia checkout. *APSF Newsletter*. 2008;23(1):1-3.
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Compliance: the practice gap

Indian literature contains strong technical guidance on anaesthesia machine hazards, checklist logic and scavenging, but direct multicentre Indian audits of pre-use checklist compliance are limited.⁵ Available Indian safety data still show why this matters: one critical incident audit reported equipment error in 4.17% of anaesthesia-related incidents, while a paediatric prospective study reported critical events in 8.9% of anaesthetics, with airway and respiratory events forming 55%.^{7,8} A recent Indian simulation study of emergency caesarean preparation found that a structured checklist reduced missed mandatory attributes from 87/550 to 12/550, highlighting the value of cognitive aids under time pressure.⁹

International audits demonstrate wide variability. Compliance was 87% in an Ethiopian cross-sectional study, but 12.46% of clinicians failed to meet the standard and 25.81% of missed standards reflected non-availability of items.¹⁰ Another Ethiopian audit found only 77.1% full compliance; automatic machine check, scavenging, self-inflating bag and ventilator checks were among the weakest domains.¹¹ In South Australia, backup oxygen cylinders were not checked in 45%, emergency ventilation devices in 67%, and breathing circuits between cases in 79%, with no documentation observed.¹² DeMaria et al. found 23 missed pre-induction setup steps in 200 procedures; manual resuscitation devices and suction were most commonly missed, especially in high-turnover and regional anaesthesia settings.¹³



Why non-compliance happens

The causes of non-compliance are usually systemic rather than purely individual. An institutional audit should therefore identify why checks are missed.

1. Time pressure and production pressure: emergency cases and high-turnover operating lists encourage shortcut behaviour.
2. Low-risk anaesthesia bias: regional anaesthesia, sedation and NORA cases may be checked less rigorously despite the need for oxygen, suction, monitors and rescue ventilation.
3. Overreliance on automated self-tests: workstation self-checks are useful but cannot replace visual confirmation, backup ventilation, suction, scavenging and case-specific readiness.
4. Unclear accountability: when technicians, residents and consultants all participate, each may assume that someone else has completed the task.
5. Equipment non-availability: a missed item may represent a system failure, not merely non-compliance.
6. Poor documentation and weak feedback: checklists become ritualistic when defects are not logged, escalated and reviewed.

5. Goneppanavar U, Prabhu M. Anaesthesia machine: checklist, hazards, scavenging. *Indian J Anaesth.* 2013;57(5):533-40.
6. Mehta SP, Eisenkraft JB, Posner KL, Domino KB. Patient injuries from anesthesia gas delivery equipment: a closed claims update. *Anesthesiology.* 2013;119(4):788-95.
7. Gupta S, Naithani U, Brajesh SK, Pathania VS, Gupta A. Critical incident reporting in anaesthesia: a prospective internal audit. *Indian J Anaesth.* 2009;53(4):425-33.
8. Dias R, Dave N, Chiluvuru S, Garasia M. Critical incidents in paediatric anaesthesia: a prospective analysis over a 1-year period. *Indian J Anaesth.* 2016;60(11):801-6.
9. Kini P, Kona Y, Pai A, Kini P. Efficacy of preoperative anesthetic safety checklist for simulated emergency caesarean section in multipurpose operation theatre setup in a developing country: an observational study [version 1; peer review: 1 approved with reservations]. *F1000Research.* 2025;14:900.
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Environmental safety: the forgotten checklist item

Environmental safety is inseparable from machine safety. A leaking circuit, poorly seated vaporizer or disconnected scavenging hose exposes staff to waste anaesthetic gases and undermines green anaesthesia. NIOSH and OSHA recommend leak prevention, functional scavenging, adequate ventilation, maintenance and good work practices to reduce waste-gas exposure.^{14,15} Low fresh gas flow is environmentally responsible only when delivered through a leak-free circuit with reliable scavenging. Thus, an APSA audit aligned to “environmental and equipment safety” should include circuit leak testing, vaporizer integrity, scavenging function, standby fresh-gas flows and defect reporting.

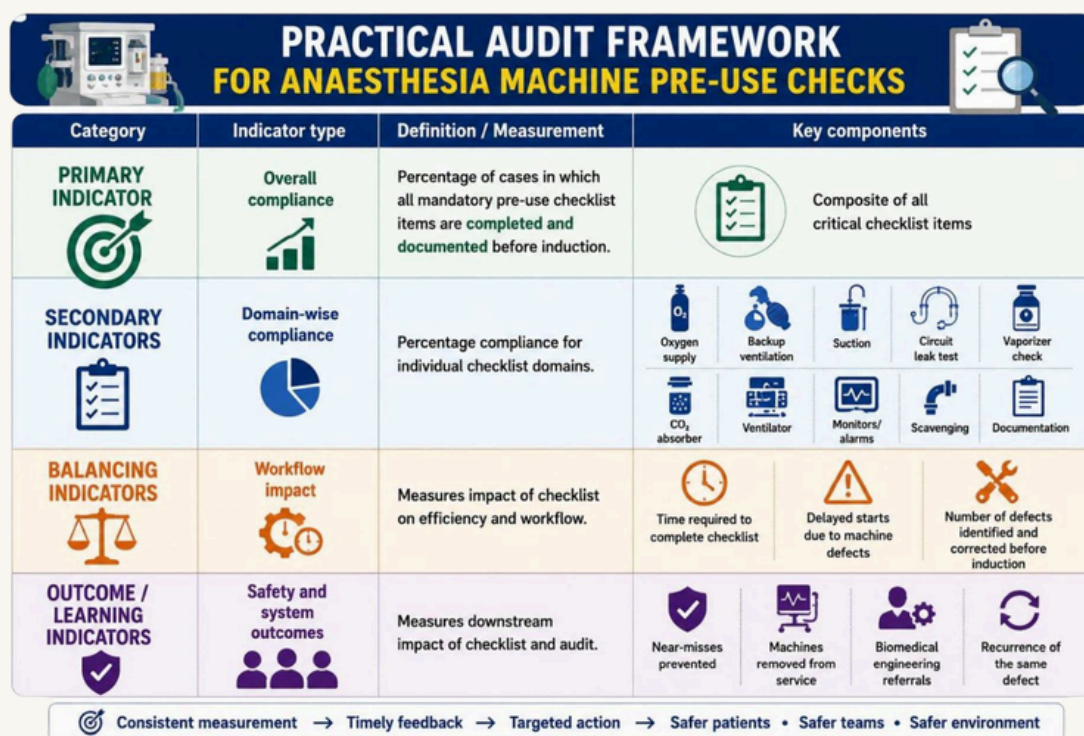
Suggested audit standard and method

The audit standard for critical items should be 100%. Unlike many clinical audits where 80-90% may be acceptable, a single missed oxygen source, unavailable self-inflating bag or undetected breathing circuit leak can be catastrophic.

A practical audit can be performed over 2-4 weeks across elective, emergency, paediatric, obstetric, regional anaesthesia and NORA locations. Data sources should include direct observation, anaesthesia records, machine self-test logs, checklist sheets and biomedical engineering defect logs. Each item should be scored as: done and documented, done but not documented, not done, not applicable or not available. This distinction separates behavioural gaps from system gaps. Re-audit should follow within 6-8 weeks.

Domain	Key audit questions
Oxygen and power	Is pipeline pressure adequate? Is the reserve oxygen cylinder full/adequate? Is AC power connected? Is battery backup available?
Backup ventilation	Is a self-inflating bag available and functioning?
Suction	Is patient suction immediately available and effective?
Breathing circuit	Has the circuit been correctly assembled? Is leak/pressure testing done? Are inspiratory and expiratory flows unobstructed?
Vaporizer and agent delivery	Is the vaporizer correctly seated, filled, closed and leak-free?
CO ₂ absorber	Is soda lime fresh and correctly fitted?
Ventilator	Has ventilator function and default settings been confirmed?
Monitoring and alarms	Are monitors available, calibrated where relevant, connected, audible and appropriately alarmed?
Scavenging	Is the waste anaesthetic gas scavenging system connected, patent and functioning?
Documentation	Is completion documented with date, time, machine ID and responsible person?

TABLE 1 -The Canadian pre-anaesthetic checklist similarly recommends confirming internal workstation self-checks, reserve oxygen, pipeline pressures, leak testing, scavenging, oxygen analyser calibration, monitor alarms and documentation, with some items repeated before each anaesthetic procedure.



14. National Institute for Occupational Safety and Health. Waste anesthetic gases: occupational hazards in hospitals. DHHS (NIOSH) Publication No. 2007-151. Cincinnati: NIOSH; 2007.

15. Occupational Safety and Health Administration. Waste anesthetic gases: guidelines for workplace exposures. Washington, DC: OSHA; 2026.

TABLE 2- Evidence snapshot: India and international data

Setting / study	Key compliance or safety statistic	Main gaps identified
India – simulated emergency caesarean OT preparation, Kasturba Medical College, Manipal, 2025	In 25 anaesthesia postgraduates tested with and without a checklist, cumulative missed mandatory attributes reduced from 87/550 without checklist to 12 with checklist . Missed desirable attributes reduced from 108/150 to 24 .	Stress, time pressure, multipurpose OT setup, emergency preparation, trainee cognitive load and absence of a structured cognitive aid.
Ethiopia – cross-sectional study, 2022	Overall compliance with pre-anaesthesia machine check and airway equipment preparedness was 87% ; 12.46% of clinicians did not meet the standard. Of missed standards, 25.81% were because the item was not available in the setup.	Non-availability of essential items, incomplete preparation and system-level resource gaps.
Ethiopia – clinical audit, 2021	Only 77.1% of checklist events were fully met; 17.7% were not met and 5.3% were not available. Critical low-compliance items included self-inflating bag 57.4% , automatic machine check 31.1% , backup battery 67.2% , anti-hypoxic device 49.2% , ventilator 57.4% and scavenging 44.3% .	Emergency pressure, regional anaesthesia cases being treated as lower risk, COVID-era fatigue, professional negligence, and repeated checking being perceived as burdensome.
South Australia – audit of three hospitals, 2012	Backup oxygen cylinder pressure/content was not checked in 45% of observations; emergency ventilation device was not checked in 67% ; breathing circuit was not tested between patients in 79% ; documentation was absent in all cases.	Lack of documentation, lack of staff assessment/accreditation, inadequate training and system failure rather than isolated individual failure.
USA – pre-anaesthetic setup observation, 2011	In 200 surgical procedures , 23 missed steps were found before induction. Manual resuscitation device availability and working suction setup were the most frequently missed items.	Production pressure, high turnover, regional anaesthesia complacency, role assumptions and time-saving behaviour.
Norway – 83,154 anaesthetics, 2002	Anaesthetic equipment problems occurred in 0.05% of regional anaesthetics and 0.23% of general anaesthetics. One-third involved the anaesthesia machine and one-quarter involved human error.	Human error, machine/breathing circuit problems, incomplete checking especially between cases.
Thailand – Thai AIMS, 1996 incident reports	Equipment failure/malfunction formed 92/1996 incidents , or 4.6% . Of these, 71.7% were considered preventable and 80.4% were caused by human error.	Ineffective equipment, haste, lack of experience, ineffective monitors, inadequate equipment, poor maintenance and guideline non-compliance.
Australia – Australian Incident Monitoring Study	Among the first 2000 incident reports, 317 involved ventilation problems. Disconnections formed 47% of these; leaks occurred in 129 incidents and misconnections in 36 . Failure to check the machine more frequent when an induction room was involved.	Disconnections, leaks, misconnections, monitor non-use/non-detection and incomplete machine checking.
USA – ASA Closed Claims gas delivery update	In gas delivery equipment claims, 85% involved provider error with or without equipment failure, and 35% were judged preventable by a pre-anaesthesia machine check.	Provider error, inadequate alarms, improvised oxygen delivery, breathing circuit misdiagnosis and incomplete pre-use checks.
WHO Surgical Safety Checklist global pilot	Adherence to all six measured safety indicators improved from 34.2% before checklist implementation to 56.7% after implementation.	Checklist adoption without full compliance, variable team engagement and incomplete implementation.

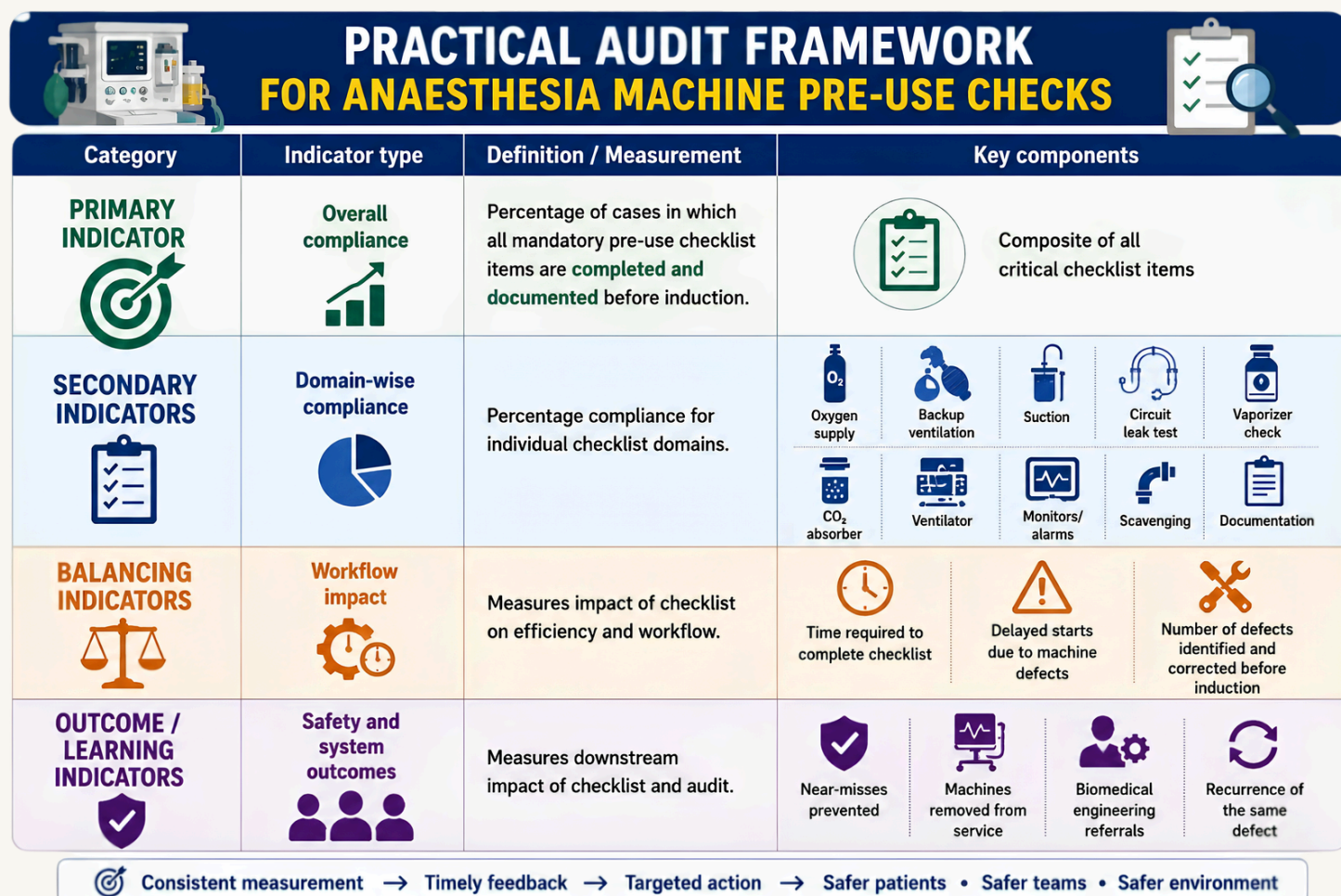
Improvement bundle

A workable improvement bundle should be simple, visible and embedded into daily workflow:

1. Display a machine-specific laminated checklist on every workstation.
2. Use a two-level process: full first-case check and short between-case check.
3. Assign named responsibility, while retaining final accountability with the anaesthesiologist.
4. Introduce a hard stop before induction: oxygen, ventilation, suction, monitoring and backup ventilation must be confirmed.
5. Create a defect escalation pathway: label "not for use," inform biomedical engineering and document closure.
6. Include NORA and emergency areas in the same audit standard.
7. Review monthly dashboards showing compliance, repeated defects and corrective actions.

Conclusion

Anaesthesia machine checking should be viewed as a patient-safety and environmental-safety intervention, not a morning formality. True compliance means that the workstation is checked, the backup plan is available, defects are corrected, scavenging is functional and the process is documented before patient exposure to risk. The safest machine is not necessarily the newest one; it is the machine that has been checked, understood, respected and made ready before every anaesthetic.



Operating Room Fire Safety: Prevention and Management Protocols

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An OR fire is not a random event; it is a predictable consequence of failing to manage three known hazards simultaneously. - ECRI Institute

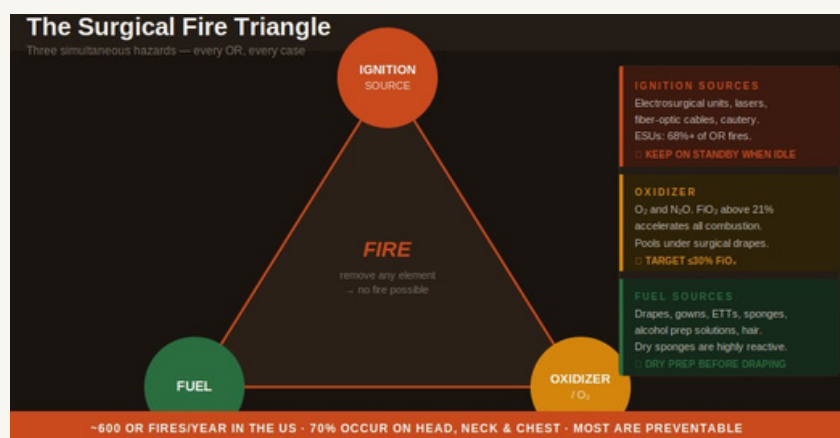
Introduction

Operating room (OR) fires remain among the most serious yet preventable complications in perioperative medicine, with 550- 650 cases reported annually in the United States and nearly one-quarter resulting in major injury or death [1,2]. Despite established guidelines from the Emergency Care Research Institute (ECRI), the Association of Perioperative Registered Nurses (AORN), The Joint Commission, and the American Society of Anesthesiologists, OR fires persist because of failures in communication, situational awareness, and coordinated planning. The OR environment uniquely combines the three elements of the fire triangle - ignition sources such as electrosurgical units and lasers, oxidisers including oxygen and nitrous oxide, and fuel sources such as drapes, alcohol-based preparations, and endotracheal tubes - making combustion highly likely when these hazards converge [3,4]. This article reviews the mechanisms, high-risk scenarios, prevention strategies, and emergency management of OR fires.

The Fire Triangle in the Surgical Suite

The OR “fire triangle” consists of an ignition source, an oxidiser, and a fuel source, all of which are routinely present in the surgical environment [Infographic 1] [1,5]. Common ignition sources include electrosurgical units, lasers, fibre-optic cables, drills, and defibrillators, while oxygen and nitrous oxide act as oxidisers that accelerate combustion, particularly when oxygen accumulates beneath drapes [2,3]. Fuel sources include surgical drapes, gauze, alcohol-based preparation solutions, airway devices, and patient hair, with incompletely dried alcohol preparations representing a major preventable hazard [6].

~600	70%	26%
OR FIRES PER YEAR IN THE US	OCCUR ON HEAD, NECK, OR CHEST	RESULT IN SERIOUS INJURY OR DEATH



1. ECRI Institute. Top 10 health technology hazards for 2022. Plymouth Meeting (PA): ECRI Institute; 2022.
2. Culp WC Jr, Kimbrough BA, Luna S. Flammability of surgical drapes and materials in varying concentrations of oxygen. *Anesthesiology*. 2021;134(5):723–31.
3. Apfelbaum JL, Caplan RA, Barker SJ, Connis RT, Cowles C, de Richemond AL, et al. Practice advisory for the prevention and management of operating room fires: an updated report by the American Society of Anesthesiologists Task Force on Operating Room Fires. *Anesthesiology*. 2023;118(2):271–90.
4. AORN. Guidelines for perioperative practice: fire prevention in the perioperative practice setting. Denver (CO): AORN; 2022.
5. The Joint Commission. Preventing fires in the operating room. Sentinel Event Alert. 2023;(Issue 29 updated). Available from: <https://www.jointcommission.org>
6. Hart SR, Yajnik A, Ashford J, Springer R, Harvey S. Operating room fire safety. *Ochsner J*. 2011;11(1):37–42.

Situational Awareness: High-Risk Procedures

The risk of OR fire varies with the surgical site, oxygen delivery method, and use of ignition devices. Procedures involving the head, neck, and upper chest carry the highest risk because oxygen delivery systems are positioned close to electrosurgical units or lasers [2,7]. High-risk procedures include tonsillectomy, tracheostomy, thyroidectomy, airway laser surgery, and upper gastrointestinal endoscopy with electrocautery. Moderate-risk procedures include ophthalmic, thoracic, breast, and caesarean surgeries using alcohol-based preparation solutions. Although closed abdominal and lower-extremity operations are considered lower risk, no procedure is entirely fire-safe, as fires may still occur due to incomplete drying of preparation solutions or oxygen accumulation beneath drapes [3,6]. Integrating fire-risk stratification into routine preoperative assessment enables targeted preventive measures before all components of the fire triangle converge. Procedure risk stratification is presented in Table 1.

Prevention: Managing the Three Hazards

OR fire prevention is fundamentally multidisciplinary. The anaesthesiologist primarily manages oxidisers, the surgeon controls ignition sources, and perioperative nursing staff oversee much of the fuel environment. Prevention fails when these responsibilities are approached independently rather than collaboratively [5,8].

Oxidizer Control

Control of supplemental oxygen is the single most important preventive intervention. The anaesthesia provider should maintain the lowest inspired oxygen concentration compatible with adequate oxygenation, particularly during head and neck procedures[3]. Open oxygen delivery beneath drapes should be minimised because oxygen rapidly accumulates in enclosed spaces. During high-risk procedures, endotracheal intubation or total intravenous anaesthesia (TIVA) may reduce the risk associated with open oxygen administration. Before ESU activation near the airway or surgical drapes, sufficient time should be allowed for oxygen dissipation from the operative field.

Ignition Control

ESUs should remain in standby mode when not in use and operate at the lowest effective power setting. Bipolar cautery is preferable to monopolar systems when clinically appropriate because it generates less stray thermal energy. ESU tips should be cleaned regularly to prevent carbon accumulation and unintended ignition. Fibre-optic light cables should never rest on drapes or combustible surfaces, as heated cable tips may ignite materials rapidly. Laser surgery requires additional precautions, including the use of laser-resistant ETTs and saline-filled cuffs rather than air-filled cuffs [6].

Fuel Management

Alcohol-based skin preparation solutions must dry completely before draping. Chlorhexidine-alcohol preparations generally require a minimum drying time of three minutes. Pooling beneath the patient, within skin folds, or around linens should be actively excluded because concealed liquid remains highly flammable after draping [4,5]. Dry gauze and sponges should be kept away from ignition sources, and saline or sterile water should remain immediately available on the sterile field for emergency suppression.

HIGH RISK	MODERATE RISK	LOWER RISK
Tonsillectomy/adenoidectomy	Ophthalmic surgery	Abdominal (closed field)
Head and neck surgery	Thoracic surgery with ESU	Lower extremity procedures
Tracheostomy	Breast surgery with ESU	Orthopaedic (minimal airway)
Thyroidectomy	Cardiac (defibrillation)	Procedures under TIVA
Facial lesion excision	Caesarean section (alcohol prep)	
Upper GI endoscopy with ESU		
Laser airway surgery		

7. Wolf GL, Sidebotham GW. Fire and burns in the operating room. Curr Opin Anaesthesiol. 2022;35(6):717-22.

8. DeMaria S Jr, Schwartz AD, Narine V, Yang S, Levine AI. Management of intraoperative airway fire. Simul Healthc. 2011;6(6):360-363.

The Fire Risk Time-Out

The Joint Commission and AORN recommend that fire risk assessment be incorporated into the surgical safety time-out whenever ignition sources, oxidisers, and fuels are simultaneously present [Infographic 2] [4,5]. This brief but structured discussion creates shared situational awareness and improves coordinated preparedness. Five elements must be verbally confirmed [Image 1]:

1. Announce the fire risk level: high, moderate, or low, to calibrate collective team vigilance for that specific case.

2. Confirm the oxygen management plan: delivery method, planned FiO₂, and whether TIVA or intubation has been selected for high-risk cases.

3. Verify preparation dry time: confirm the solution is fully dry and no pooling has occurred beneath the patient before draping begins.

4. Designate fire suppression equipment: confirm the location of the CO₂ extinguisher, room water source, and saline basin on the sterile field.

5. Assign emergency response roles: designate who manages the airway, suppresses the fire, activates the alarm, and coordinates evacuation. Role ambiguity during a fire is a documented root cause of preventable patient injury [5].

Communication failures and role ambiguity are repeatedly identified in root-cause analyses of OR fire injuries. Structured pre-procedural dialogue, therefore, represents one of the most effective preventive interventions currently available.

- | | |
|----------|---|
| 1 | ANNOUNCE THE FIRE RISK LEVEL
The surgeon or charge nurse verbally designates the case as high, moderate, or low fire risk based on procedure type, anesthesia plan, and oxygen delivery method. This cues the team about the level of vigilance required. |
| 2 | CONFIRM O₂ MANAGEMENT PLAN
The anesthesiologist confirms what oxygen delivery method will be used, the planned FiO ₂ , and whether TIVA or endotracheal intubation has been chosen for high-risk cases. This is the single most impactful preventive decision the team makes. |
| 3 | VERIFY PREP DRY TIME
Confirm that alcohol-based prep solution has fully dried and no pooling has occurred before draping proceeds. This step has a documented, direct relationship with ignition incidents and takes less than 10 seconds to complete. |
| 4 | DESIGNATE FIRE SUPPRESSION EQUIPMENT
Confirm the location of the CO ₂ fire extinguisher, the room's water source, and the saline basin on the field. Everyone in the room should know where these are before the case begins — not after a fire has started. |
| 5 | ASSIGN ROLES FOR FIRE RESPONSE
Briefly establish who will manage the airway, who will extinguish the fire, who will call for help, and who will manage patient evacuation if required. A fire in the OR is not the time for ambiguity about roles. |

Pre-Incision Fire Prevention Checklist

OXIDIZER CONTROL

- ☐ Target FiO₂ ≤30% for face/neck
- ☐ Wait 3 min after draping to use ESU
- ☐ Avoid open O₂ under drapes
- ☐ Consider TIVA for high-risk cases
- ☐ Intubate for laser airway surgery
- ☐ Monitor O₂ concentration under drapes continuously
- ☐ Purge O₂ from field before ESU use
- ☐ Confirm anesthesia gas plan at surgical time-out

IGNITION CONTROL

- ☐ ESU on standby when not active
- ☐ Use lowest effective power setting
- ☐ Prefer bipolar over monopolar ESU
- ☐ Clean ESU tip before use
- ☐ Never rest ESU on drapes
- ☐ Fiber-optic cable: off surfaces when not in active use
- ☐ Laser-resistant ETT for laser Rx
- ☐ Defibrillator pads: clear field of O₂ before shock delivery

FUEL MANAGEMENT

- ☐ Prep solution fully dry before draping
- ☐ Min 3 min dry time for ChloroPrep
- ☐ Check for pooling under patient
- ☐ Wet sponges at surgical perimeter
- ☐ Cover patient's hair for head/neck
- ☐ Saline basin ready on field
- ☐ CO₂ extinguisher location confirmed
- ☐ Cuff of ETT inflated with saline (laser cases)

FIRE RISK MUST BE VERBALLY ADDRESSED AT THE SURGICAL SAFETY TIME-OUT FOR ALL CASES WHERE THE FIRE TRIAD IS PRESENT
JOINT COMMISSION · AORN · WHO SURGICAL SAFETY CHECKLIST

The Fire Risk Time-Out

The perioperative team's actions during the first 30 seconds following ignition largely determine the clinical outcome. The OR-adapted RACE protocol - Rescue, Alarm, Confine, Extinguish/Evacuate is shown in Infographic 3 [2,7].

Airway Fire Protocol

A fire within an ETT or supraglottic airway is a distinct, immediately life-threatening emergency requiring a separate protocol. Every OR team must have practised this sequence before it is needed [Image 2] [8,9]:

1. Any team member identifying the fire should immediately announce it aloud.
2. The surgeon should stop the procedure at once, discontinue electrocautery or lasers, and remove the endotracheal tube or airway device if involved.
3. The anaesthetist should immediately discontinue all airway gases and disconnect the breathing circuit.
4. Another team member should extinguish the fire using sterile saline or water; saline and wet swabs should always be readily available on the instrument trolley.
5. The surgeon should remove any burnt airway fragments or smouldering debris.
6. The anaesthesiologist should re-establish ventilation using room air initially, preferably with a self-inflating bag, and secure the airway as required.

7. If the fire persists, theatre staff should use a carbon dioxide extinguisher while another team member activates the fire alarm.

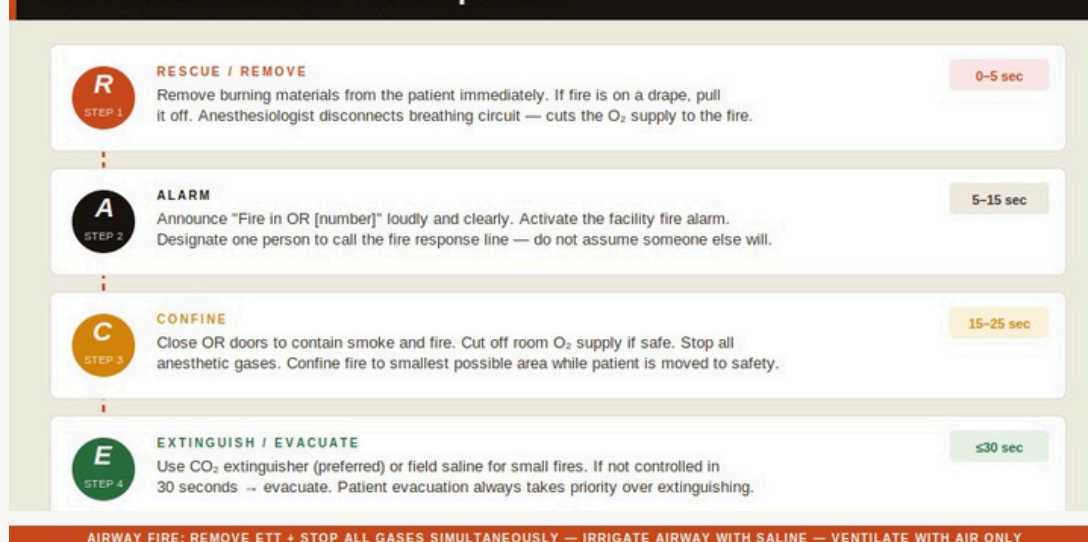
8. If patient or staff safety remains compromised, immediate evacuation and implementation of the institutional fire-drill protocol are required.

Once the environment is secured, bleeding should be controlled and the airway thoroughly evaluated with rigid bronchoscopy for residual debris, thermal or inhalational injury, while all airway devices are inspected for retained fragments. Significant fires require continued intubation, ICU monitoring, and supportive management, including humidified oxygen and dexamethasone for airway oedema.

9. National Fire Protection Association. NFPA 99: health care facilities code. Quincy (MA): NFPA; 2021.

- | | |
|----------|---|
| 1 | SIMULTANEOUSLY: REMOVE THE ETT AND STOP ALL GAS FLOW
The anaesthesiologist removes the burning endotracheal tube while simultaneously discontinuing all airway gases. These two actions must happen at the same moment — continuing gas flow while the tube is on fire extends the burn injury. Call out: 'ETT fire — tube out, gas off.' |
| 2 | POUR SALINE INTO THE AIRWAY
Irrigate the airway with saline or water to extinguish residual burning and reduce thermal injury to the mucosa. Use the sterile saline basin on the surgical field. Do not delay this step. |
| 3 | REESTABLISH VENTILATION VIA MASK
Ventilate the patient with air only — not oxygen — initially. Once the fire is confirmed out and the airway is inspected, reintubate if necessary. Immediate post-fire bronchoscopy is recommended to assess the extent of airway injury. |
| 4 | EXAMINE THE AIRWAY AND THE REMOVED TUBE
Check the removed ETT for retained fragments — pieces of burned tube can remain in the airway and must be located and removed. Assess the patient for burns to lips or nares, stridor, carbonaceous sputum, and bronchospasm. |
| 5 | POST-FIRE MONITORING AND MANDATORY REPORTING
Admit the patient for observation regardless of apparent severity — delayed pulmonary injury from thermal exposure can be fatal. Complete a mandatory incident report. Preserve all equipment for root cause analysis. Debrief the entire team. |

The RACE Protocol — OR-Specific



Laser Surgery: An Elevated Risk Environment

Surgical lasers - CO₂, Nd: YAG, and KTP types - operate at power densities capable of instantly igniting materials that would withstand ESU contact. ETT fires during airway laser procedures account for a disproportionate share of OR fire deaths [6,9]. Standard PVC tubes must never be used in the laser field; laser-resistant ETTs are mandatory. ETT cuffs should be inflated with saline, not air. The lowest effective FiO₂ must be maintained, a wet throat pack must be positioned below the surgical site, and laser safety eyewear must be worn by all room personnel without exception [6].

Training and Safety Culture

Most OR fires occur in settings where individuals recognised hazards but failed to establish a coordinated prevention plan [5,9]. Consequently, fire prevention depends not only on protocols but also on institutional culture and regular team training. Teams that conducted even brief fire scenario drills responded faster and made fewer critical errors [Image 3].

1. Annual simulation drills: Every OR team should complete a simulated fire scenario at least once per year. A structured tabletop exercise with defined trigger events and team responses provides the cognitive rehearsal necessary for effective real-time performance [5].

2. Standardised time-out language: a consistent phrase such as 'Fire risk: high/moderate/low - O₂ plan confirmed,' spoken identically in every case, builds procedural memory that prevents omissions under stress [4,9].

3. Psychological safety: any team member, regardless of hierarchy, must be empowered to stop the process and name a fire hazard. Circulating nurses frequently identify hazards before other team members [5,8].

4. Near-miss review: departments that formally debrief events where fire did not escalate to injury accumulate cumulative knowledge that measurably lowers their fire risk over time.

Conclusion

Operating room fires are rare but potentially catastrophic events that are largely preventable through effective management of oxidisers, ignition sources, and fuels, supported by structured team communication and prompt emergency response. Ultimately, OR fires are foreseeable hazards best prevented through shared vigilance, preparation, and coordinated perioperative practice.

7. Wolf GL, Sidebotham GW. Fire and burns in the operating room. *Curr Opin Anaesthesiol.* 2022;35(6):717-22.

8. DeMaria S Jr, Schwartz AD, Narine V, Yang S, Levine AI. Management of intraoperative airway fire. *Simul Healthc.* 2011;6(6):360-363.

1	ANNUAL SIMULATION DRILLS — NOT OPTIONAL Every OR team should run a simulated fire drill at least once a year. A tabletop walkthrough with specific trigger events and team responses accomplishes much of the cognitive preparation needed. High-fidelity simulation is better when available.
2	STANDARDIZE THE FIRE RISK TIME-OUT LANGUAGE Adopt a standardised phrase — such as 'Fire risk: high/medium/low, O ₂ plan confirmed' — said the same way, every time, for every case, without exception. Consistency builds the muscle memory that prevents omission under stress.
3	MAKE IT SAFE TO SPEAK UP ABOUT HAZARDS Circulating nurses and scrub technicians are often the first to notice pooling of prep solution, an ESU left active on a drape, or a drape tent forming near the oxygen source. Organisational culture must support any team member stopping the process to name a hazard, regardless of hierarchy.
4	REVIEW EVERY NEAR-MISS, NOT JUST FIRES THAT CAUSE INJURY Near-misses are a gift — they are fires that failed to escalate into injuries. OR departments that systematically debrief and analyse near-misses and 'good catches' build cumulative knowledge that shifts their fire risk profile over time.



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Every movement needs its energy, and ours comes from a remarkable team of early-career anaesthesiologists spread across the length and breadth of India.

When we put out the call, we were genuinely moved by the response. These are busy clinicians — residents, junior consultants, early-career specialists — who chose to raise their hands and say, *"Patient safety matters to me, and I want to do something about it."* That means a lot.

Our APSA Ambassadors are rooted in their own institutions and communities, yet united by a shared purpose — making anaesthesia safer for every patient. They will engage with peers through academic forums, social media, awareness campaigns and community outreach. They will be writing, presenting, debating, and most importantly, having real conversations about why safety culture matters in our specialty.

They are not just representatives — they are change-makers. And they are already making a difference simply by choosing to be here.

We are proud of this team. Not just for what they will do, but for who they already are — thoughtful, driven young doctors who understand that great anaesthesia is not only about skill, but about systems, awareness, and accountability.

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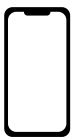
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