Operating Theatre Fire Safety Policy Template

Surgical Burns Action Group

Contents

1. Introduction and Background 2
2. Objectives 3
3. Scope 4
4. Definitions 4
5. Roles and Responsibilities 5
6. Procedural Details: Fire Prevention Protocol 12
7. Emergency Response Protocol (In the Event of a Fire) 14
8. Training and Competency 16
9. Monitoring Compliance and Audit 17
10. References and Supporting Documents 18

Surgical Fire Safety Policy (Prevention & Management of Fires in Operating Theatres)

Document Status: Draft for NHS Trust Board Ratification
Effective Date: (To be assigned)
Review Date: (2 years from effective date or sooner if national guidance issued)
Author: (e.g. Theatre Safety Committee)
Approved by: (e.g. Trust Patient Safety & Governance Board)

1. Introduction and Background

Surgical fires – fires that occur *in, on, or around a patient* during surgery – are rare but potentially catastrophic events. They can cause serious harm to patients (e.g. severe burns of the face, airway, or body) and staff, and result in costly litigation.[i] In the UK, the issue gained prominence after an Expert Working Group report in 2020 highlighted the absence of national guidelines and the urgent need for action.[ii] Between 2009 and 2019, 631 clinical negligence claims for surgical burns were notified to NHS Resolution, costing ~£13.9 million in settlements and fees. [iii]These numbers, coupled with personal patient stories of trauma, underscore that surgical fires, while infrequent, have significant human and financial impact.[iv]

Internationally, surgical fires are recognized as a preventable patient safety issue. The US FDA issued formal guidance in 2018 on preventing OR fires, and organizations like ECRI, APSF, and Joint Commission have long promoted fire risk assessments and team training. In England, however, no centralized NHS guidance existed as of 2021 – meaning surgical fire precautions were not standardized and such fires were *not* classified as "Never Events".[v] The lack of a Never Event designation is specifically because "no national guidance or safety recommendations [were] available" at that time.[vi] This Trust policy aims to bridge that gap by providing evidence-based, standardized procedures for preventing and managing surgical fires, in alignment with emerging national recommendations.

Rationale: Surgical fires are entirely preventable with proper precautions.[vii] Key factors in the operating theatre "fire triangle" include the presence of an ignition source (e.g. electrosurgery, lasers, fiber-optic light cables), fuel (e.g. alcohol prep solutions, drapes, oxygen-rich atmosphere), and an oxidiser (supplemental oxygen or nitrous oxide).[viii] Preventive strategies focus on controlling these factors – for example, avoiding alcohol-based prep pooling and allowing it to dry, minimizing oxidiser concentration, and handling ignition devices safely.[ix] Unfortunately, reviews have found inconsistent practices across the NHS: a 2018 FOI survey found that out of 135 NHS trusts in England and health boards in devolved nations, only 23 had specific surgical fire protocols or training in place. The majority relied solely on general fire safety policies that often did not mention OR fire risks.[x] This policy directly addresses that gap by instituting specific surgical fire safety standards Trust-wide.

This document has been developed with reference to:

- **National Safety Standards for Invasive Procedures (NatSSIPs)** – to ensure integration of fire risk checks into the surgical safety process (e.g. team briefs, checklists).
- **Centre for Perioperative Care (CPOC) guidance** – incorporating recommendations from the multidisciplinary perioperative safety community, including the 2020 Surgical Fires Expert Working Group report submitted to CPOC.[xi]

- **NHS Resolution guidance** ("Did You Know? Preventing Surgical Burns", 2019) – highlighting claims data and risk reduction advice, which emphasize training and proper use of flammable prep agents.
- **AfPP (Association for Perioperative Practice) guidelines** – particularly the 2020 AfPP Safety Standards on surgical fire prevention, and the outputs of the Surgical Burns Action Group (established 2021) which advocate mandatory reporting, enhanced training, and patient information on surgical fire risks.[xii]
- **NICE Guidance NG125 (2019)** – which draws attention to fire risk from alcoholic skin preparations and recommends measures such as ensuring prep dries by evaporation and avoiding alcohol-based prep if diathermy is used near mucous membranes.[xiii]
- Relevant MHRA and HSE guidance on use of medical devices, flammable substances, and the Regulatory Reform (Fire Safety) Order 2005 for general fire precautions.

By implementing this policy, the Trust demonstrates commitment to proactively safeguard patients and staff from surgical fire incidents. The policy's protocols transform best practice and expert recommendations into local actionable procedures – so that every operating theatre team is prepared to "plan & practice how to manage a surgical fire" and, above all, prevent one from ever occurring.

2. Objectives

The objectives of this Surgical Fire Safety Policy are to:

- **Prevent fires in operating theatres** through rigorous identification and mitigation of risk factors before and during surgery.
- **Ensure rapid, coordinated response** by the surgical team in the event a fire does occur on or in a patient, minimizing harm.
- **Define clear roles and responsibilities** for all theatre staff (surgeons, anaesthetists, nursing staff, ODPs, etc.) in fire prevention practices and in emergency actions.
- **Mandate training and drills** for operative staff so that fire safety knowledge and skills are maintained.
- **Align with NatSSIPs and other national standards**, integrating fire risk assessment into the surgical pathway and fostering a culture of safety and open communication.
- **Support compliance with regulatory requirements** (e.g. Fire Safety Order 2005) in the context of the operating department, and with NHS Resolution's risk management guidelines to reduce surgical burn claims.
- **Provide governance and accountability**: ensuring incidents are reported (via Datix and to national bodies), investigated, and that this policy is reviewed regularly in light of new evidence or guidance.

Ultimately, the policy seeks zero tolerance for preventable harm from surgical fires – treating these events as "wholly preventable" patient safety incidents, as recommended by expert bodies.[xiv]

3. Scope

This policy applies to *all surgical and invasive procedures* performed within Trust facilities, including operating theatres, procedure rooms (e.g. endoscopy, interventional radiology, minor ops rooms), and any location where electrosurgery, lasers, or other ignition sources are used invasively on a patient. It covers all disciplines (e.g. general surgery, ENT, plastics, obstetrics, cardiothoracic, etc.) and is particularly pertinent for surgeries above the xiphoid process (upper torso, neck, head), where proximity of oxygen sources to surgical sites elevates fire risk.

All members of the multidisciplinary team are within scope: this includes surgeons and surgical assistants, anaesthetists and anaesthetic assistants/ODPs, scrub nurses, circulating nurses, surgical technologists, and any visiting staff or observers in the operating theatre.

Non-clinical support staff (e.g. biomedical engineers, maintenance) are also expected to be aware of relevant sections (such as ensuring functional equipment and fire suppression systems).

External contractors or visiting teams using Trust operating rooms (such as robotic surgery teams, laser technicians) must adhere to this policy as a condition of practice.

Note: This policy focuses on patient-related fires in theatre. It augments, but does not replace, the Trust's general Fire Safety Policy and evacuation procedures for facility fires. In case of any fire spreading beyond the immediate patient or generating significant smoke, standard hospital fire response procedures (RACE: Rescue-Alarm-Contain-Extinguish/Evacuate) must be followed in conjunction with the specific guidance here for patient fire management.

4. Definitions

For the purpose of this policy, the following definitions apply:

- **Surgical Fire:** A fire that occurs on or inside a patient who is undergoing a medical or surgical procedure, in an area that is under the control of the surgical team.[xv] This includes fires in the airway (e.g. endotracheal tube fire) or on the patient's body (e.g. drape fire, surgical site fire). It can also extend to fires in the immediate surgical field even if not directly on the patient (e.g. drapes, instruments).
- **Airway Fire:** A surgical fire that ignites in a patient's airway, typically involving components like an endotracheal tube, throat pack, or bronchoscopic equipment. Often occurs during laser surgery of the airway or high O_2 concentration cases. Airway fires are particularly dangerous due to the risk of inhalation injury and difficulty in access.
- **Non-Airway Surgical Fire:** Any surgical fire that is not in the airway – for instance, a fire on the patient's skin, surgical drapes, gown, or equipment on/near the patient.
- **Ignition Source:** Anything that can provide sufficient heat or spark to ignite fuel in an oxidiser-rich environment. In operating theatres, common ignition sources are electrosurgical units (diathermy pencils**)**, lasers (especially in ENT or ophthalmology), fibre-optic light cables/endoscopes, defibrillator paddles, high-speed drills or burrs (which can cause sparks), argon beam coagulators, and even heat from orthopedic saw blades or cautery wires.
- **Fuel Source:** Flammable and combustible materials present in the surgical environment. Examples include alcohol-based skin prep solutions (and their vapours), surgical drapes

and gowns (often made of cellulose or synthetic material that can burn), gauze and swabs (especially if alcohol-soaked), the patient's hair or body fur, intestinal gases (which contain methane and hydrogen), any petroleum-based ointments on the patient (e.g. emollients, ointments, which are paraffin-based and flammable), and plastic or rubber equipment (tubing, masks, breathing circuits).

- **Oxidiser Source:** A gas that supports combustion; in the OR this is primarily oxygen (whether delivered via nasal cannula, face mask, open draping, or high-flow sources) and nitrous oxide (N_2O). Room air (21% O_2) is also an oxidiser, but an oxygen-enriched atmosphere (anything above ~30% O_2) greatly accelerates fire ignition and spread.
- **Fire Risk Assessment:** A preoperative evaluation of how likely a surgical fire is, based on the presence of the above three elements. The team assesses factors such as surgical site location, need for open O_2, and use of ignition devices. A simple scoring or checklist may be used (e.g. ticking three risk factors indicates high risk).
- **Laser Safe ETT:** A specially designed endotracheal tube that is less flammable, often used in airway surgery with lasers. These tubes may have saline-inflated cuffs (sometimes dyed with methylene blue so cuff rupture is visible).
- **NATSSIPs:** National Safety Standards for Invasive Procedures – a set of principles to ensure consistency in safe perioperative practice across NHS (e.g. team brief, timeout, debrief). Locally, "LocSSIPs" refer to Local versions of these standards. This policy integrates with NatSSIPs by adding fire risk considerations to the team brief and timeout steps.
- **CPOC:** Centre for Perioperative Care, a cross-specialty collaborative (including RCoA, RCS, etc.) aimed at improving perioperative patient outcomes. CPOC is tasked with incorporating the surgical fire prevention work into national standards.[xvi]

(All staff should familiarise themselves with these terms; understanding them is crucial for applying the policy correctly.)

5. Roles and Responsibilities

5.1 Theatre Team – General Responsibilities

Safe surgery is a team effort, and preventing surgical fires requires vigilance from every team member. All theatre staff must:

- **Participate in fire risk assessment** during the team brief: openly discuss if the case involves fire risk factors (e.g. high O_2, flammables, devices). If yes, agree on preventive measures and emergency plan.
- **Speak up if you identify a hazard**: Any person who notices (for example) pooling of alcohol prep, an unsecured oxygen mask under drapes, or a heat source left on drapes must immediately alert the team and ensure it's corrected. The culture should be non-hierarchical regarding safety – prevention of harm is everyone's responsibility.
- **Know the location and use of fire equipment**: All staff should know where to quickly grab a CO_2 fire extinguisher in their theatre, and where the fire alarm and emergency gas

shut-off are. Staff should be trained in using a CO_2 extinguisher on or near a patient (aim at base of fire, use short bursts to avoid cold injury to patient).

- **Attend required training**: The Trust will provide training (see Section 8) – including periodic simulation drills of a patient fire. Staff must attend at least one fire drill or training session per year and upon induction.

If a surgical fire occurs, patient safety and extinguishing the fire are the top priorities. Each role has specific tasks as outlined below, but roles can overlap – e.g. if one person is incapacitated or busy, another team member should take any critical action (like stopping O_2 flow).

5.2 Surgeon (Operator)

Prevention duties: The operating surgeon (or proceduralist in charge) is responsible for leading the pre-op fire risk discussion. They must ensure:

- **Safe use of ignition sources**: use devices according to manufacturer guidance; inspect insulating sheaths on diathermy tips or cables before use. Do not activate diathermy or lasers unless clinically necessary and in view of the target (especially when working in small cavities or with laparoscopic instruments). When not actively in use, place devices in a safe standby mode or holster (not on the patient or drapes).
- **Minimize ignition in O_2-rich environment**: Communicate with the anaesthetist to allow time after increasing oxygen or using cautery. For example, if using cautery near an open oxygen source, request a reduction in oxygen flow if patient condition allows. Cease use of ignition sources if inspired O_2 is high and cannot be reduced.
- **Manage fuels in field**: Use surgical drapes in a manner to prevent oxygen pooling (e.g. avoid occlusive draping around the head/neck – leave openings for O_2 to dissipate). Cover the patient's hair with wet towels if operating near hair (hair is flammable). If alcohol-based prep was used, verbally confirm drying time has elapsed before first incision or using cautery. Ensure no excess alcohol solution is trapped under the patient (check linens under patient after prepping).
- **High-Risk protocols**: For high-risk cases (e.g. tracheal surgery with laser), ensure special precautions: use flame-resistant ETT or laser-safe tubes, fill cuffs with saline/methylene blue; have syringes of saline on standby; limit laser energy and have wet sponges in the field.
- **Leadership in briefing and debriefing**: The surgeon must include fire risk in the team brief and, if a fire incident or near-miss occurred, ensure it's discussed in the debrief and reported.

Fire response duties: In event of a fire, the surgeon (being scrubbed and at the patient) typically coordinates immediate extinguishing on the patient:

- If drapes or patient are on fire (non-airway): Stop the procedure immediately. The surgeon (with scrub nurse's help) should remove burning drapes or materials from the patient, tossing them to the floor (ideally away from the anesthesia machine to avoid O_2). They or the scrub nurse should douse flames with sterile water or saline on the field. Smothering can be done with wet surgical towels. The surgeon should call for the CO_2 extinguisher if initial measures fail, but avoid spraying directly on the patient unless necessary (to limit

cold/chemical injury). If fire is spreading, the surgeon may direct everyone to evacuate once patient is safe to move.

- If an airway fire: If a laser or airway procedure ignites the tube or airway, the surgeon must halt the operation immediately and protect themselves and the patient. Usually the anaesthetist will remove the tube and halt gases, but the surgeon can assist by quickly removing any instruments from the airway and packing the area with wet gauze to snuff out flames. The surgeon should also remove any smoldering materials in the mouth/throat (e.g. throat pack). Once the tube is out and fire quenched, the surgeon should be prepared to assist with re-establishing the airway (e.g. perform jaw thrust, emergency cricothyrotomy if needed in extreme scenario).
- Post-fire: The surgeon should assess any surgical field damage. If the patient's surgical area was involved in fire, take steps to treat the burn (e.g. apply saline dressings). They should decide, in coordination with anaesthetist, whether to continue surgery or abort – patient safety is paramount. Ensure all potentially retained fragments (burned tube pieces, etc.) are accounted for.

5.3 Anaesthetist (Anaesthetic Team)

Prevention duties: The anaesthetist manages the oxidiser risk and contributes to ignition/fuel control:

- **Use minimal oxidiser concentration**: Avoid high-flow open oxygen delivery when possible. For cases above the xiphoid (particularly head, neck, or open chest), try to use a closed airway device (LMA or ETT with cuff). If a patient must have supplementary O_2 by mask or cannula (e.g. sedation cases), keep flow at the lowest effective rate and consider asking the surgeon to pause before using ignition sources so oxygen can be temporarily reduced.
- **Avoid N_2O** if not absolutely needed, since nitrous oxide supports combustion similarly to oxygen. Use air/O_2 mix instead during high-risk periods if patient's oxygenation allows.
- **Communicate about timing**: Inform the surgical team of any periods of high oxygen (e.g. during pre-oxygenation or if the patient needs >30% O_2) so they can avoid ignition use at that moment. Conversely, before the surgeon uses diathermy or laser in a risky area, reduce O_2 for a short interval if patient can tolerate it (some guidelines suggest dropping to 21% O_2 at least 1 minute before use of laser/cautery in high-risk scenario).[xvii]
- **Airway device preparation**: If using an ETT in a laser case, fill the cuff with saline (and dye if available) to resist ignition and provide visual cues of cuff rupture. Ensure any throat packs are wet (and radiopaque). Secure all airway tubes and cables to prevent displacement that could lead to O_2 leaks.
- **Monitoring and vigilance**: The anaesthetist should continuously monitor for signs of fire: unexplained smoke, sudden flash, or heat. They are also well placed to smell if something is burning. If cautery is used near an oxygen source (e.g. head/neck under drapes), watch the O_2 levels and be ready to disconnect O_2 if ignition is suspected.
- **Emergency readiness**: Have a pre-filled 50 mL syringe of saline immediately available on the anaesthetic cart to inject into the airway or onto the patient if needed. Ensure the breathing circuit can be disconnected quickly (no ties that impede quick removal).

Fire response duties: The anaesthetist's immediate role is to protect the patient's airway and halt gas flow:

- If fire on patient (not in airway): Stop all gases flow temporarily if possible. Often, the anaesthetist will hit the oxygen flush off or disconnect the circuit to avoid feeding O_2 to the fire. If the patient is intubated and stable, stop ventilation momentarily. They should be ready to assist evacuation if necessary. Once the fire is out, the anaesthetist resumes ventilation and replaces any airway devices that were compromised by fire or smoke. They should assess the patient's respiratory status – if the patient was breathing without a tube, consider if intubation is now needed due to inhalation of smoke.
- **If airway fire:** Simultaneously (often in split-second): the anaesthetist will disconnect oxygen supply (stop ventilator, close O_2 valve) and extubate the patient immediately if an ETT/LMA is in place. The burning tube is removed and thrown clear of the patient. The anaesthetist (or surgeon, whoever is quicker) should then flood the airway with saline – this can be pouring sterile water/saline into the mouth and airway to douse flames. Use the syringe or pour from a bottle – speed is more important than sterility now. Once the fire is out, the anaesthetist must re-establish ventilation. If possible, ventilate initially with room air (to avoid reignition). Quickly assess the airway: look with laryngoscopy or bronchoscope if available to see damage. Expect swelling, so prepare for a difficult reintubation – use a smaller tube if needed or emergency airway techniques. After a confirmed airway, deliver 100% O_2 to treat the patient's respiratory needs.
- **Patient care post-fire**: For any fire, once immediate danger is addressed, the anaesthetist leads the assessment of patient injuries: check for facial burns, airway burn (listen for stridor or wheeze, check carbonaceous material in airway), and systemic effects (tachycardia, bronchospasm, CO inhalation). Initiate necessary treatments: e.g. bronchodilators, humidified O_2, steroids for airway edema as appropriate, pain relief, IV fluids if burns are significant. The anaesthetist should also be prepared to call for additional help (ENT or ICU backup). They should coordinate patient transfer to ICU or burns unit as required.

Additionally, after the event, the anaesthetist should preserve any removed airway devices (put the burnt ETT in saline or bag it) for investigation and not discard it. They also need to document the event thoroughly in the anaesthetic record.

5.4 Scrub Nurse/Practitioner

Prevention duties: The scrub nurse (or scrub ODP) sets up the sterile field in a fire-conscious manner:

- **Ensure dry prep and safe draping**: Before drapes go on, confirm with the surgeon and anaesthetist that the prep solution (especially if alcohol-based) is fully dried (minimum 3 minutes or per manufacturer). Use gauze to blot excess if needed, and remove any soaked materials from the field. When handing over drapes, provide flame-retardant drapes if available for high-risk cases. Consider using an iodine-impregnated incise drape to isolate alcohol from oxygen if appropriate (but note, iodine drapes are contraindicated if alcohol pooling present).
- **Instrument safety**: Place electrocautery pencil in holster when not in use – do not let it rest on patient or drapes. Announce "cautery off" when passing it. Keep light cables off

the drapes and check that the light source is on standby when not in use (communicate with circulating nurse).

- **Saline readily available**: Have at least one bowl of sterile saline or water on the field at all times in any case involving electrosurgery or laser (even if not obviously high-risk). Also have a large (50 mL) syringe filled with saline in your kit, plus small saline-soaked sponges ready to use.
- **Moist padding**: In throat or airway cases, ensure throat packs or gauze used by surgeon are moist (hand them already moistened in saline). For tonsil/adenoid cases, prepare moistened swabs to hand to surgeon to place around the site (reduces fire risk).
- **Count and control fuels**: Know what materials on your field are flammable – e.g. dry gauze, sponges, spilt alcohol, petroleum dressings. Manage them: avoid excess use of tumescent fluids containing alcohol, keep track of any alcoholic prep sticks, and remove soaked materials promptly.
- **Communicate**: Inform the team if you observe any unsafe practice (e.g. surgeon about to use cautery too soon after prep). Also, confirm water is ready: e.g. verbally say "I have water for fire, if needed" in briefing.

Fire response duties: The scrub nurse is ideally positioned to extinguish flames on the sterile field:

- **If drapes or patient sterile field catches fire**: Immediately take action to extinguish. Use the sterile saline: pour it onto the fire or apply saline-soaked towels. You should quickly remove burning drapes from the patient – pull them away and onto the floor (beware of dislodging equipment, but fire threat overrides at that moment). If small instrument or sponge is on fire, drop it into the saline bowl or throw it off field. The scrub should hand the surgeon wet sponges or more saline as needed. It may be prudent to quickly grab the metal tray or bucket and invert it over a small fire on the patient to smother (if feasible). If the fire is not under control in a second or two, alert the surgeon if not already aware, and prepare to move back if the CO_2 extinguisher is coming.
- **If airway fire**: After anaesthetist removes the tube, the scrub nurse should hand saline or water to the surgeon or pour it into the patient's mouth as directed. Have forceps ready in case charred bits need removing. Once the fire is out, the scrub can assist by getting new sterile ETT or tracheostomy kit opened quickly if reintubation or surgical airway is needed.
- Preserve the sterile field if possible: If the fire is small and quickly controlled, try to keep a portion of the field sterile to continue care of the patient's wounds. However, if the fire was significant, sterility is likely compromised; be prepared to cover the patient with clean sheets and start fresh if surgery must continue.
- **Post-incident:** The scrub nurse will do instrument and swab counts once it's safe, to ensure nothing is left in patient and to check if any sponge caught fire and remnants remain. The scrub should isolate any equipment that malfunctioned (e.g. the cautery pencil that caused fire) and pass it off-field for investigation. They also should assist in applying any initial dressings to burns.

5.5 Circulating Nurse / Operating Department Practitioner (Circulator)

Prevention duties: The circulating nurse/ODP manages room and equipment readiness:

- **Room prep:** Verify a CO_2 fire extinguisher is present and accessible in the theatre (and within service date). Check that oxygen supply shut-off is known and how to operate it. Ensure electrosurgical units have the appropriate return pad and alarms on. Any lasers in use must have warning signs and a standby mode. Dim lights can make alcohol flames easier to see; consider reducing ambient lighting during laser cases to help visibility of any flame (alcohol flames are almost invisible in bright light).
- **During case:** The circulator should ensure suction is available (a suction catheter can aspirate smoke or irrigant if needed during a fire emergency). They also manage flammable materials off the field – e.g. do not let prep solutions pool under patient: after the surgeon preps, quickly assist by drying under the patient's sides or repositioning sheets if needed. Dispose of soaked materials in a safe metal bin.
- **Monitoring:** Stay attentive to any unusual sights or odours – e.g. smell of something burning or smoke. Since the circulator is not scrubbed, they can move around to identify source of any smoke.
- **Coordination:** If an external laser technician or equipment rep is present, ensure they are briefed on our fire protocol and have emergency stop controls within reach.

Fire response duties: The circulating nurse or ODP acts as the "runner" and communicator in a fire event:

- **On detection of fire,** if not already done, immediately shout a warning ("Fire in theatre!") to ensure the whole team is aware. Activate the fire alarm for the department if the fire is not extinguished within a few seconds or if it is spreading beyond the patient. Activation can be via wall alarm or emergency phone call as per hospital protocol; this summons the hospital fire response team.
- **Call for help:** Dial the hospital emergency number (e.g. 2222 in NHS) to report a fire in operating theatre, giving exact location and that it involves a patient. This ensures backup and preparation in ED/ICU if needed.
- **Bring extinguishing tools:** Obtain the CO_2 fire extinguisher and bring it just outside the OR door or to the periphery of the room. Only discharge it on the patient if the surgical team's attempts with saline fail and fire persists – in practice, the circulator would hand it to whoever can best aim it (keeping nozzle ~30 cm from patient if possible). Use short bursts to avoid excessive cold injury.
- **Control gases and power:** If the anaesthetist is busy with the airway or patient, the ODP may need to reach over and hit the "Emergency Off" switch on the anesthesia machine to stop all gases. Also, be prepared to cut power to electrical equipment if an electrical fire (e.g. diathermy unit itself catching fire) – unplug devices if safe to do so.
- **Evacuation coordination:** If the fire cannot be quickly controlled or smoke is accumulating, the circulator leads efforts to get the patient and staff out. Follow RACE: ensure the patient is ventilated or given some O_2 if possible and move them (preferably on their bed, or via evacuation sheet) out of the theatre to a safe area. Close OR doors after evacuation to contain fire. The circulator should take charge of headcount and make sure no one is left behind in the theatre.

- **After extinguishment:** Assist with patient care as needed (bringing additional equipment, helping ventilate patient with Ambu bag if anesthesia machine is off). Ventilate the room by activating smoke evacuation or simply opening doors/windows if appropriate (after alarm is active).
- **Liaise with responders:** When firefighters or hospital fire team arrive, brief them on status (e.g. "small fire now out, patient critical" or "fire still burning in equipment"). Also coordinate with other ORs to cease using ignition sources or halt operations if needed (since alarms may prompt shutting off central gas supply).
- **Reporting:** Secure the scene after. Do not reset alarms until authorized. The circulator should begin gathering info for the incident report: who was present, what burned, etc. They will typically be the one to fill out Datix with input from the team.

5.6 Theatre Manager / Supervisor

The Theatre Manager or appointed safety lead has overarching responsibility to ensure compliance with this policy:

- **Before cases**: ensure all theatre staff have completed fire safety training. Check that every theatre's fire equipment is in place (extinguishers, fire blankets if available, gas shutoff signage, etc.). Include surgical fire risk in routine safety audits.
- **Policy enforcement**: If any practice is observed that contravenes this policy (e.g. staff using alcohol prep inappropriately or not doing fire risk assessments), intervene and correct it. Escalate repeated non-compliance to higher management.
- **In event of fire**: provide support and oversight. Ensure an external report to the National Patient Safety system (eg. NRLS/LFPSE) is made in coordination with the Trust's risk management. Support the team involved – these incidents can be traumatic for staff, so arrange debriefs and support as needed (including counselling if required).
- **Investigation**: Lead or delegate a root cause analysis investigation for any surgical fire. Involve technical experts (e.g. medical physics for equipment failure analysis, fire safety officer). Develop an action plan from lessons learned.
- **Liaison**: Communicate with hospital Fire Safety Officer, MHRA (for device-related fires), and external bodies as appropriate. If the incident meets RIDDOR or other reporting criteria, ensure those are followed.
- **Policy review**: After any significant incident or annually, review if this policy needs updates in light of new guidance or lessons learned.

5.7 Estates/Fire Safety Officer

The hospital Fire Safety Officer and Estates department must:

- Ensure all ORs have appropriate fire suppression tools (extinguishers, alarms) maintained and regularly serviced.
- Advise on installation of oxygen monitoring if needed in theatres (to detect O_2 enrichment).

- Participate in drills and provide expertise in fire response and evacuation planning for surgical departments.
- Post-event, inspect the theatre structural elements if a fire occurred to ensure it's safe to resume operations there.

5.8 All Staff (Summary)

Every member of staff in the perioperative environment has a duty to "Stop the Line" if a hazardous situation arises. Prevention is a collective responsibility, and immediate response relies on coordination and clarity of roles. Appendix A of this policy provides a quick-reference Roles & Actions Chart for surgical fire response (who does what in the first 30 seconds of a fire).

(If roles overlap due to staffing mix, the senior person present should ensure all critical tasks are covered. For example, in a sedation case without an anaesthetist, the surgeon must also manage stopping O_2; or if no scrub nurse, the surgeon handles those tasks.)

6. Procedural Details: Fire Prevention Protocol

This section outlines the step-by-step protocol for preventing surgical fires, to be incorporated into perioperative practice:

6.1 Pre-operative Period (Day of Surgery)

- **Pre-list checks:** Theatre staff shall verify the availability of a working CO_2 fire extinguisher in the theatre. The anesthetic machine's oxygen alarms must be functional, and rescue equipment (e.g. self-inflating bag, sterile water) present.
- **Patient assessment:** During the WHO Sign In (upon arrival in theatre), if the patient is having surgery above the chest or using known fire-contributing factors, this should be noted. Check for any patient-applied flammable products (hair sprays, oil-based lotions); if present, cleanse those areas prior to surgery.
- **Team briefing (NatSSIPs Brief):** Include a discussion of fire risk:
    - Identify if the case involves high fire risk: e.g. head/neck surgery with open O_2, or use of lasers, large amounts of alcohol prep, etc. Use a Fire Risk Assessment Score if implemented (e.g. 3-point checklist: surgical site above xiphoid, open O_2, ignition device). Document the fire risk level (low/normal vs high) on the briefing record.
    - If high risk: Plan specific precautions: who will have saline ready, confirmation of ETT with saline cuff if laser, plan to avoid N_2O, etc.. Assign a team member to call out a warning before using ignition source (some teams use "cautery on?" – "O_2 safe" verbal checks).
    - Review roles in event of fire briefly: e.g. "If a fire occurs, we'll follow the protocol: Dr. X will stop gases, I (surgeon) will douse with saline, Nurse Y will pull alarm if needed."
- **Equipment check:** Just before induction or during setup, the circulating nurse and scrub practitioner perform final checks on equipment:

- All electrosurgical pads properly placed on patient (to avoid sparks elsewhere).
- No cracks in fiber optic cables; light source on standby until use.
- Laser equipment test-fired and then put in standby; warning signs posted.
- Suction working (for smoke evacuation if needed).
- Evacuation routes are clear of obstructions in case rapid egress needed.

- **Anaesthetic induction:** If general anaesthesia with intubation, ensure securing of ETT to prevent O_2 leak. If sedation with nasal cannula, ensure cannula is properly seated (not blowing O_2 freely under drapes). Consider moist gauze around cannula to absorb excess O_2.
  - For throat surgeries, once intubated, placement of wet throat pack by surgeon (document its presence).
  - If patient has significant facial hair and surgery in that area, consider water-based gel to flatten hair (or even shave, with patient consent, because hair is fuel).

6.2 Intra-operative (During Surgery) – Ongoing Precautions

- **Maintaining a safe environment:** The circulating nurse sets OR ventilation to appropriate rates (scavenging of anesthetic gases also helps remove excess O_2). They also continuously remove any waste that could be fuel – e.g. blood-soaked gauze in open air is less an issue, but alcohol-soaked materials must be removed immediately.
- **Oxygen management:** Anaesthetist titrates oxygen to lowest effective FiO_2 especially during use of cautery. If surgical pause allows, can reduce O_2 or switch to air for a few minutes during high-risk steps (provided patient can tolerate).
- **Communication cues:** The team should use agreed-upon cues. For instance, surgeon might say "Laser on" loudly before firing laser, and anaesthetist confirms "O_2 at 21%" or similar. Another example: anaesthetist might warn "I need to give 100% O_2 for a few minutes for patient" so surgeon avoids ignition sources during that period.
- **Electrosurgery use:** Use the lowest power and shortest activation time that achieves the surgical aim. Do not activate in open air – touch tissue first then activate. If using monopolar cautery in a deep cavity, be aware of potential ignition of gases: e.g. cautery in colon with methane – ensure adequate gas venting or suction in bowel if entered (to avoid intra-abdominal explosion).
- **Surgical field monitoring:** The scrub nurse and surgeon watch for pooling of any liquids. E.g. if using skin prep again (during procedure, if needing re-prep), use minimal amount and capture runoff. Also, monitor instruments heating – e.g. prolonged use of a drill can heat tissue/drapes; have saline to cool as needed.
- **Environmental conditions:** Avoid nitrous oxide unless absolutely indicated. Keep OR door closed to prevent room O_2 level from rising (though ORs usually well ventilated).
- **Readiness during case:** The bowl of saline on field should be refreshed if contaminated. The fire extinguisher should remain unobstructed. Team members should not leave the room unless their role is covered by someone else aware of this protocol.

6.3 End of Procedure and Post-op

- **Post-procedure debrief (NatSSIPs Debrief):** Discuss any issues related to fire safety. If there was a near-miss (e.g. momentary flash that self-extinguished, or smelled smoke from cautery misuse), note it and plan to report and address it. Ensure throat packs are removed (document it to avoid leaving fuel in patient post-op!).
- **Patient handover:** If any minor fire or singe occurred, even without injury, communicate this during handover to recovery staff (so they can watch for any airway issues, etc.).
- **Incident reporting:** Any actual fire, no matter how small (even if no injury, e.g. a drape corner singed), **must be reported** internally for learning. Use the Datix system to record the event, and notify the department manager.

By following the above preventive steps for every case, the likelihood of a surgical fire is drastically reduced. The motto is "Plan, Communicate, Prevent" at all times.

7. Emergency Response Protocol (In the Event of a Fire)

Despite all prevention efforts, staff must be prepared to act swiftly if a surgical fire does ignite. The following protocol outlines the immediate response:

Initial Actions – R.A.C.E. adapted for OR:

1. **Recognise and Rescue:** The person who notices the fire (any team member) shouts "Fire!" All sterile field staff stop the procedure. Rescue the patient by extinguishing flames on them and prepare for possible evacuation. The anaesthetist stops gas flow. Surgical team removes burning materials from patient.
2. **Alarm:** If the fire is more than a trivial flash that is already out, the circulator must activate the fire alarm and call for help (according to hospital code). Announce clearly location: "Fire in Theatre X, minor or major, patient involved."
3. **Contain:** Close OR doors to contain smoke/fire (if fire is not yet out). Switch off medical gas supply if needed to starve fire of oxidiser (anaesthetist or ODP will do this if ongoing fire). The scrub team containing fire on patient with saline also prevents spread.
4. **Extinguish/Evacuate:** Use CO_2 extinguisher if needed to fully extinguish flames. If fire grows or heavy smoke, evacuate patient and staff.

These steps often happen near-simultaneously in the OR scenario; a well-prepared team will accomplish them within seconds.

Specific Response for Different Fire Types:

- **Fire on Patient/Drapes (Non-Airway fire):**
    - **Stop ignition source** – e.g. surgeon and scrub cease using diathermy/laser immediately.
    - **Remove drapes** – Quickly pull burning or smoldering drapes off patient to the floor. (If small area on drape is on fire, one can also smother it by folding the drape on itself, but generally get it off the patient).

- **Extinguish flames on patient** – Pour saline or water onto the burning area of patient's skin or surgical site. If an instrument is burning (like cautery tip with a flame), drop it in saline basin.
- **Use CO_2 extinguisher** if needed – If fire persists beyond 1-2 seconds of saline application, use the CO_2 extinguisher on remaining flames (aim away from the patient's face if possible; short bursts).
- **Care for patient** – Once fire is out, resume ventilation (anaesthetist may have paused it) and administer oxygen as needed. Check the patient for burns. If the patient is not already intubated and fire/smoke was significant, consider prophylactic intubation due to potential airway swelling.
- **If fire cannot be controlled quickly or room fills with smoke** – initiate evacuation. The patient should be ventilated with Ambu bag if possible and moved to safe area. Close OR doors to contain fire.

- **Airway Fire (ETT or airway ignition):**
  - **Disconnect and remove** – Anaesthetist stops ventilator and disconnects circuit; simultaneously pulls out the burning endotracheal tube (avoiding pulling too hard if melted – might need gentler removal to not break tube).
  - **Extinguish in airway** – Pour saline into the airway through the mouth immediately to douse any flames. Often 50-100 mL of saline is used.
  - **Remove sponges** – Any throat packs or gauze in the airway must be removed as they could be smoldering.
  - **Ventilate and assess** – After fire is out, attempt mask ventilation with room air. Prepare and perform re-intubation promptly (likely with a smaller tube, and avoiding high O_2 initially). Assess airway damage via bronchoscopy if equipment and situation allow.
  - **Call for help early** – Airway fires are very serious; notify ENT or a difficult airway team if available. Have surgical airway instruments ready in case intubation fails.
  - **Follow-up care** – The patient will likely need bronchoscopy and ICU. Administer humidified oxygen, consider corticosteroids to reduce edema, and monitor for pulmonary complications.

After Immediate Response (Fire Out, Patient Stabilised):

- **Treat injuries:** The surgical team should switch to damage control mode. For external burns, cover with saline-soaked gauze then sterile drapes. Do not apply ointments; just cool water to burned area initially. For airway injury, ensure oxygenation and prepare for lung treatments.
- **Incident containment:** The area of fire (drapes, etc.) may still emit smoke; ensure it's completely extinguished. Turn on smoke evacuator or use wall suction to clear smoke if minor. Engineering may need to reset HVAC if alarm triggered.
- **Save all involved materials:** Do not throw away burned items. The circulator will bag the ETT, any malfunctioning device, and charred drape pieces for investigation.

- **Documentation:** Note time of fire, duration, what was burning, and actions taken in patient's op record. This is critical for later analysis and for medical management of injuries.
- **Report to appropriate authorities:** Beyond internal reporting, certain fires must be reported to external bodies:
    - **NHSE/NPSA** via National Reporting and Learning System or its successor LFPSE (safety learning) – especially if moderate or severe harm occurred.
    - **MHRA** – if equipment was involved (e.g. cautery unit fault).
    - **Fire marshal/brigade** – if hospital fire response was activated, they will document in fire log.
    - **NHS Resolution** – notify if there's potential claim or significant patient harm (usually via the Trust legal/risk team).
- **Investigation**: Initiate a serious incident investigation (led by the Patient Safety team). All staff involved should provide statements. This policy mandates an Root Cause Analysis for any surgical fire, with a report to be reviewed by the Trust's safety committee.
- **Duty of candour:** If the patient suffered harm (even minor burns), explain to the patient (or family) what happened and that a full investigation is underway, as per the Duty of Candour regulation.

8. Training and Competency

All operating theatre personnel must receive training in surgical fire safety. This includes:

- **Induction Training:** New hires (surgeons, anaesthetic staff, nurses, ODPs) shall undergo training on this policy and managing OR fires. This can be via an e-learning module and a practical demonstration of using a fire extinguisher on a simulated patient fire.
- **Annual Fire Drill:** Each theatre team must participate in at least one simulated surgical fire drill per year. This drill should include practicing the scenario of an airway fire and a drape fire, with roles as per this policy. Evaluate response times and identify improvements. In-situ simulations are recommended.
- **Crisis resource management (CRM) training:** Team communication and role clarity under stress is vital. The Trust will incorporate surgical fire scenarios into team CRM workshops or simulation days (e.g. simulate a laser airway surgery fire).
- **Competency verification:** Key roles like laser operator or diathermy user should have competency checklists including fire prevention (for example, surgeons using new laser equipment must demonstrate understanding of precautions before independent practice).
- **Re-training:** In the event of a surgical fire incident or near-miss at our Trust or nationally, targeted re-training or briefing will be conducted to reinforce lessons learned.
- **Documented knowledge:** The policy should be readily available in each theatre. Staff should sign off that they have read and understood the policy annually.

- **Specialty-specific training:** Areas like ENT or thoracic surgery that inherently have higher fire risk (laser to airway, high O_2 environments) should hold additional focused training. Anaesthetists who regularly do airway surgery cases should be familiar with laser-safe practices and share knowledge with surgical colleagues.

Training records will be maintained by the Theatre Manager and reported in annual safety reports. The aim is to embed a high level of preparedness so that, if a fire emergency arises, the response is reflexive and effective.

9. Monitoring Compliance and Audit

To ensure the policy is effective and being followed:

- **Incident Monitoring:** The Risk Management team will track all reported surgical fire incidents or near-misses. Trends or recurring issues (e.g. frequent alcohol pooling observed) will be addressed through policy adjustments or re-training.
- **Audit of Briefing**: Periodic audits (e.g. quarterly) of surgical safety briefing documentation will check that "fire risk" was discussed for applicable cases. Audit criteria may include: Was fire risk documented for head/neck cases with open O_2? Were high-risk cases managed with a documented plan (saline available, etc.)?
- **Equipment Audit:** Annual audit of theatres to ensure all electrical surgical equipment is properly maintained (up-to-date servicing) and that each theatre has the required safety items (extinguishers, signage). Biomedical engineering will also report on any insulation failures or issues found in routine equipment checks.
- **Compliance Reporting:** Results of audits and any fire incidents will be reported to the Trust's Health and Safety Committee and Quality/Safety Committee. These bodies will oversee if additional measures or resources are needed.
- **Patient Outcomes:** Although rare, if a surgical fire occurs, patient outcome and follow-up will be tracked. The Trust will share de-identified lessons learned with national bodies (e.g. through CPOC or AfPP networks) to contribute to wider safety improvements.
- **Review of Policy:** This policy will be reviewed at least every 2 years, or sooner if:
    - A significant surgical fire incident occurs (internal or reported from another Trust).
    - New national guidance is issued (for example, if CPOC/NatSSIPs release formal standards on fire safety, or if NHS England declares surgical fires Never Events in future).
    - Advances in technology that alter fire risk (e.g. new surgical energy devices) emerge, requiring updated precautions.

10. References and Supporting Documents

This policy is informed by the following key references and evidence sources, which staff are encouraged to consult for further detail:

1. **NICE Clinical Guideline NG125 – *Surgical site infections: prevention and treatment*** (National Institute for Health and Care Excellence, April 2019). – *See section on antiseptic skin preparation (recommendation 1.3.10) highlighting fire risk from alcohol-based preps*.[xviii]

2. **NHS Resolution – *"Did You Know? Preventing Surgical Burns"*** (2019). – *Analysis of 631 surgical burn claims (2009–2019) and risk management advice*. [xix]

3. **Expert Working Group Report – *"A Case for the Prevention and Management of Surgical Fires in the UK"*** (September 2020) – *AfPP and partners' recommendations submitted to CPOC, covering incidence data, FOI findings, and detailed prevention strategies*.[xx]

4. **Association for Perioperative Practice (AfPP) – *Standards and Recommendations for Safe Perioperative Practice, 5th ed.*** (2020). – *Includes new guidance on surgical fire precautions and management algorithms.*[xxi]

5. **Centre for Perioperative Care (CPOC),** *National Safety Standards for Invasive Procedures (NatSSIPs) 2*, January 2023, [xxii]

6. **How to Manage Surgical Fires – Poster (AfPP/BD)** – *A quick reference poster outlining the steps to manage airway vs non-airway fires and key hazard points (e.g. bowel gas, drapes).*[xxiii]

7. **Rodger, D. "Surgical fires: Still a burning issue in England and Wales." *Journal of Perioperative Practice* 30(5): 135-140 (2020)** – *Study of NRLS data showing under-reporting and harm statistics of surgical fires.*[xxiv]

8. **House of Commons Library Briefing – *"Preventing surgical fires in the NHS"*** (13 Dec 2021, CDP-2021-0211) – *Parliamentary briefing summarizing the state of surgical fire safety, including Ministerial response about lack of Never Event status*

Policy Approval: This policy has been reviewed by the Theatre Users Group and the Trust Fire Safety Officer. It is approved by the Trust Clinical Governance Board on (date). It will be reviewed on or before (date) by the Policy Custodian (Director of Surgery or designee).

[i] Patient Safety Learning, 'Surgical Fires and Burns: The Untold Stories and Efforts for Prevention', *Patient Safety Learning Hub*, 15 August 2024, https://www.pslhub.org/learn/patient-safety-in-health-and-care/high-risk-areas/surgery/preventing-surgical-burns/surgical-fires-and-burns-the-untold-stories-and-efforts-for-prevention-r11901/.
[ii] Kulakiewicz, A. and Powell, T., 'Preventing Surgical Fires in the NHS', *House of Commons Library*, 13 December 2021, https://commonslibrary.parliament.uk/research-briefings/cdp-2021-0211/.
[iii] Patient Safety Learning, 'Surgical Fires', *Patient Safety Learning Hub*, 2024
[iv] Ibid.
[v] Kulakiewicz, A. and Powell, T., 'Preventing Surgical Fires', *House of Commons Library*, 2021.
[vi] Ibid.
[vii] Patient Safety Learning, 'Surgical Fires', *Patient Safety Learning Hub*, 2024
[viii] Ibid.
[ix]National Institute for Health and Care Excellence (NICE), 'Diathermy in Surgery: Recommendations', *NICE Guidance*, 13 August 2021, https://www.nice.org.uk/guidance/ng125/chapter/recommendations#:~:text=If%20diathermy%20is%20to%20be,carried%20out.
[x] NHS Resolution, 'Did You Know? Preventing Surgical Burns' (2019), *Analysis of 631 Surgical Burn Claims (2009–2019) and Risk Management Advice*, https://www.pslhub.org.
[xi] Kulakiewicz, A. and Powell, T., 'Preventing Surgical Fires', *House of Commons Library*, 2021.
[xii] Patient Safety Learning, 'Surgical Fires', *Patient Safety Learning Hub*, 2024
[xiii]NICE, 'Diathermy in Surgery', *NICE Guidance*, 2021.
[xiv] Kulakiewicz, A. and Powell, T., 'Preventing Surgical Fires', *House of Commons Library*, 2021.
[xv] Ibid.
[xvi] Ibid.
[xvii] Association of Surgical Technologists (AST), 'Surgical Fire Prevention: Guidelines for Best Practice', *Association of Surgical Technologists*, 2021, https://www.ast.org/ceonline/articles/484/484.pdf.
[xviii] NICE, 'Diathermy in Surgery', *NICE Guidance*, 2021.
[xix] NHS Resolution, 'Preventing Surgical Burns', 2019.
[xx] Expert Working Group, 'A Case for the Prevention and Management of Surgical Fires in the UK' (September 2020), *Association for Perioperative Practice*, https://usercontent.one/wp/www.surgicalburns.co.uk/wp-content/uploads/2023/12/A-case-for-the-prevention-and-management-of-surgical-fires-in-the-UK-Report.pdf?media=1702.
[xxi] Association for Perioperative Practice (AfPP), *Standards and Recommendations for Safe Perioperative Practice – Fifth Edition*, 2022, https://www.afpp.org.uk/publications/standards-recommendations-for-safe-perioperative-practice-fifth-edition-2/.
[xxii] Centre for Perioperative Care (CPOC), *National Safety Standards for Invasive Procedures (NatSSIPs) 2*, January 2023, https://cpoc.org.uk/sites/cpoc/files/documents/2023-02/1.%20CPOC_NatSSIPs_FullVersion_2023_0.pdf.
[xxiii] Association for Perioperative Practice (AfPP) and BD, 'Surgical Fires Poster: Raising Awareness, Avoiding Preventable Harm', *Patient Safety Learning Hub*, 22 August 2023, https://www.pslhub.org/learn/patient-safety-in-health-and-care/high-risk-areas/surgery/preventing-surgical-burns/surgical-fires-poster-raising-awareness-avoiding-preventable-harm-r9967/.
[xxiv] Rodger, D., 'Surgical Fires: Still a Burning Issue in England and Wales', *Journal of Perioperative Practice*, 30(5), 2020, pp. 135–140, https://www.researchgate.net/publication/335836265_Surgical_fires_Still_a_burning_issue_in_England_and_Wales.