

Surgical Fires: raising awareness, avoiding preventable harm

Theatres are a high risk area - plan & practise how to manage a surgical fire

Theatres: Steps to manage a surgical fire

If a Patient Catches Fire

- Call for help and inform theatre team:
 - Activate fire alarm
 - Dial hospital fire emergency number and report location and nature of fire
 - Bring CO2 fire extinguisher into theatre

If AIRWAY fire:

- Extinguish fire:
 - Stop laser or diathermy
 - Discontinue ventilation AND fresh gas flow
 - Remove tracheal tube if on fire
 - Remove flammable material from airway
 - Flood airway with 0.9% saline

After fire extinguished:

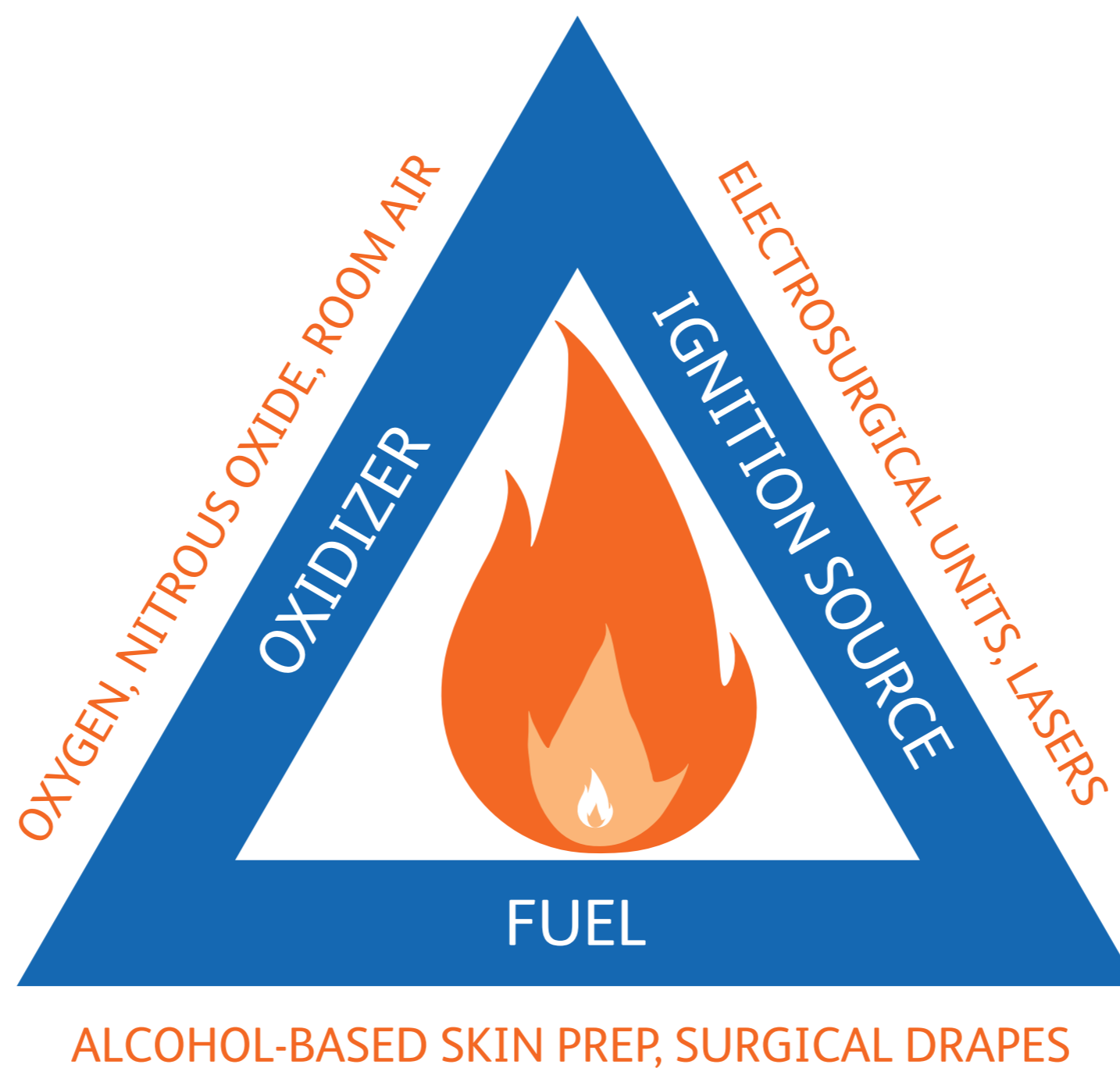
- Re-establish ventilation
- Minimise O2, avoid N2O
- Check airway for damage and debris
- Consider bronchoscopy
- Re-intubate

Assess patient and devise ongoing management plan

- Confirm no secondary fire, assess smoke risk to patient, consider intensive care.

Surgical fires require three elements to occur

U.S food and drug administration



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Keep involved materials or devices for inspection and report to the MHRA.

If secondary non-patient fire occurs, or concerned about smoke/fire risk to staff, follow local fire procedures.

If NON-AIRWAY fire:

- Extinguish fire:
 - Stop laser or diathermy
 - Remove all drapes and burning material
 - Flood fire with 0.9% saline or saline soaked gauze
 - Use CO2 extinguisher
- After fire extinguished:
 - Re-establish ventilation
 - Minimise O2, avoid N2O
 - Assess damage
 - Consider inhalational injury if not intubated
 - Consider intubation depending on degree of injury

Reference:-

The Association Of Anaesthetists of Great Britain & Ireland 2018.

The Hazards

Flammable Oils & Emollient Skin Creams

Paraffin-based emollients on skin, dressings or clothing are a potential fire risk.



Laparoscopic Stack System

The light source should be placed on standby mode when not in use.

Alcoholic Bulk Bottle & Skin Prep Applicators

The quantity of flammable fluid used to prepare the skin should be kept to a minimum to avoid run-off and pooling, on or around the patient. Alcohol-based skin preparations can be absorbed into body hair and can pool on the body surface. Precautions should be taken to prevent pooling underneath drapes or in skin creases for example, groin and umbilicus. Some swabs can absorb up to 300ml. This volume will almost certainly lead to run-off and pooling. Use an appropriate size swabs or applicator for the area requiring preparation. Alcohol flames are difficult to see under the operating lights.



Light Source

The light cable should be placed on standby mode, and contained securely when not in use.



Gas from Punctured Bowel

Caution should be applied when using active electrodes in the presence of intestinal gases; these contain hydrogen and methane which are highly flammable.

Anaesthetic Machine

An explosive atmosphere is a mixture of a dangerous substance or substances (gas, mist, dust, vapour) with air, which has the potential to catch fire, or another similar incident (HSE 2013). Non-flammable endotracheal intubation tubes should be used where there is a risk of damage from laser radiation. Such tubes should be considered mandatory for head and neck surgery.

Safe Use of Oxygen

Use a closed oxygen delivery system. If using an open delivery system, take additional precautions to exclude oxygen and flammable/combustible gases from the operative field, such as draping techniques that avoid accumulation of oxygen in the surgical field.



Laser Unit

Thermal lasers used in surgery create a very high temperature to vaporise tissue. Adequate precautions are essential to prevent the risk of fire. Anaesthetic gases support combustion, therefore, an effective anaesthetic scavenging system must be in place. A carbon dioxide fire extinguisher must always be available in theatre and staff must have received training in its use.



Patient Warming Device

Trapping of pooled prep solution or vapours under drapes can aid combustion and increases the risk of fire or burn injury.

Surgical Drapes

The prep agent should be allowed to dry and vapours to dissipate before application of an incise drape or surgical drape. The prep agent remains flammable until completely dry. Vapours occurring during evaporation are also flammable. Any run-off should be contained by absorbent material and removed before the drapes are applied. If drapes are applied before the preparation has dried, vapour can accumulate. Alcohol flames are difficult to see under operating lights.

Electrical Surgical Unit (ESU)

ESU's use high frequency alternating electrical current for cutting and coagulation. These are a potential ignition source for fire. Active electrodes should not be used in the presence of flammable substances, including alcoholic antimicrobial skin preparations and tinctures. Always use a return electrode monitoring system. In addition to serving as an ignition source, monopolar energy use can directly result in unintended patient burns from capacitive coupling and intra-operative insulation failure. If a monopolar electro-surgical unit (ESU) is used, do not activate when near or in contact with other instruments.



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