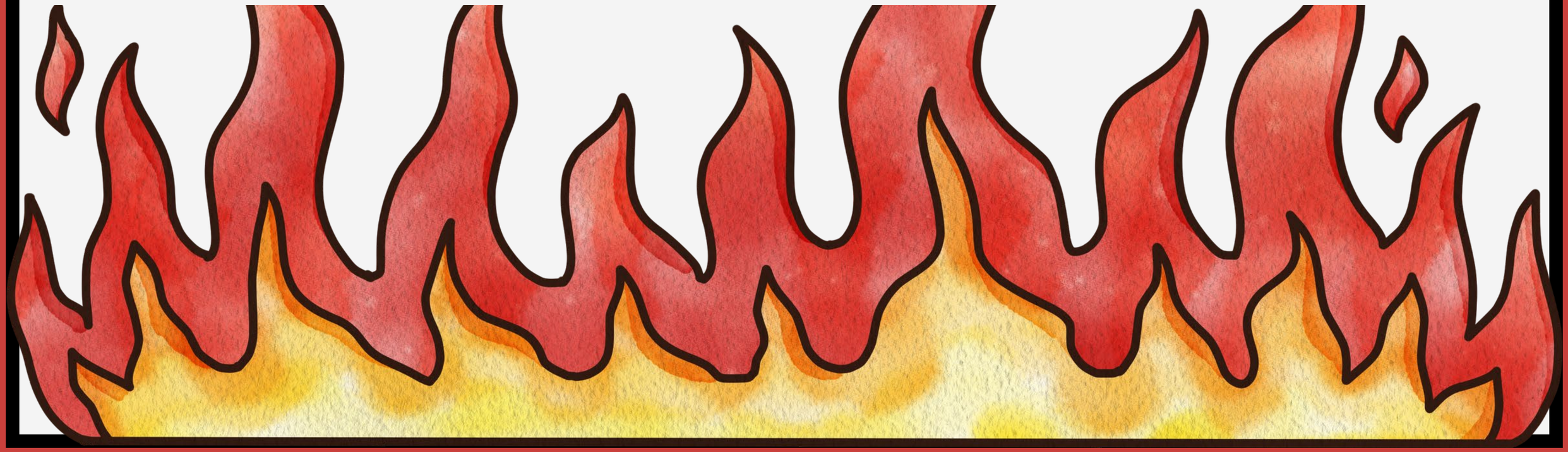
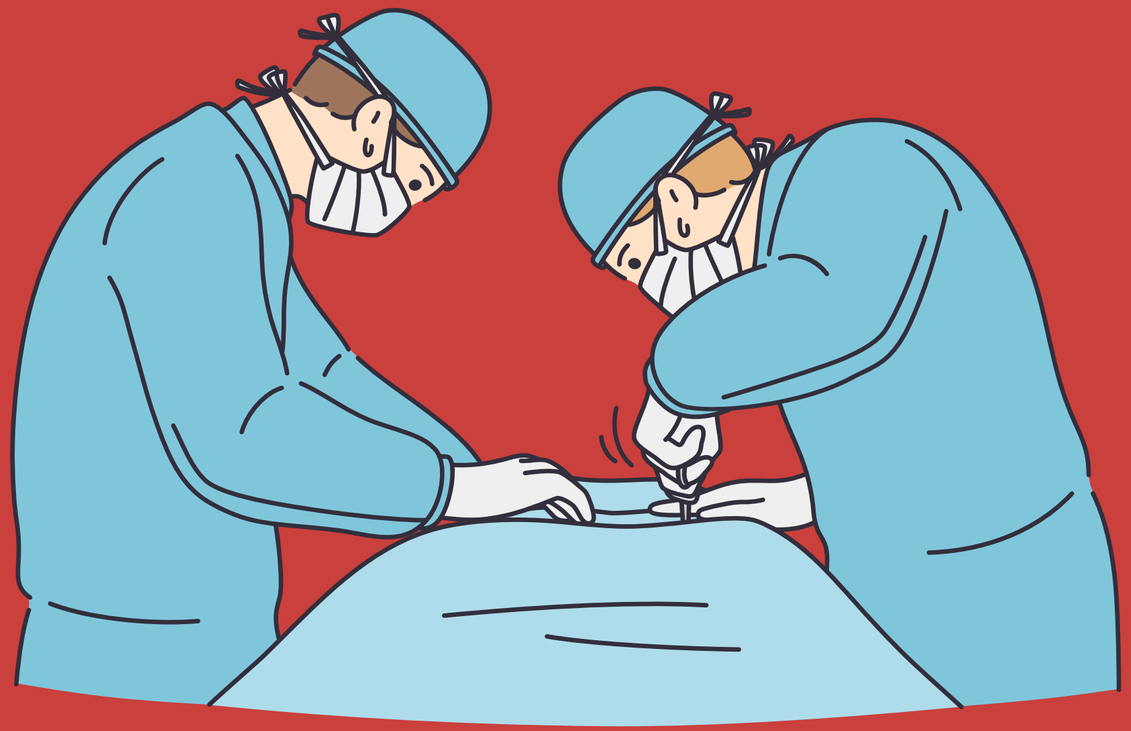
FIRE SAFETY ACROSS SURGICAL & PROCEDURAL AREAS

PREVENT, RESPOND, PROTECT



Why Fire Safety Matters



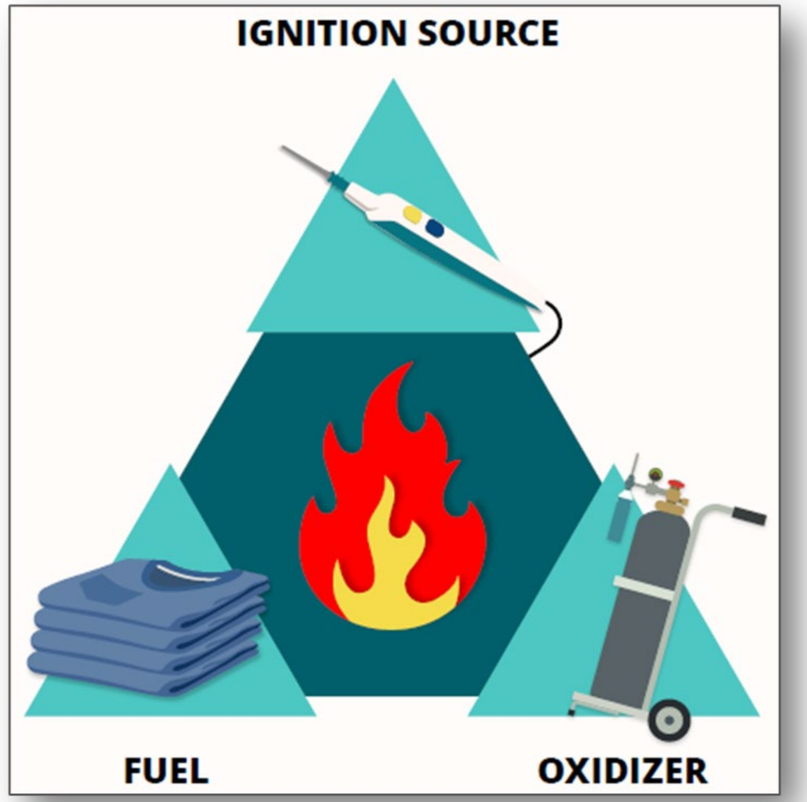
- Surgical procedural rooms contain **oxygen-rich** environments, electrical equipment, and flammable materials.
- Surgical procedural fires are **rare but life-threatening**.
- Understanding fire risks can **prevent injury, protect patients, and save lives.**
- **Goal of this training:** Equip all staff with **prevention strategies and emergency response actions.**

The Fire Triangle

Fires require **3 elements** to ignite:

- **Fuel:** Drapes, alcohol-based preps, hair, plastic tubing
- **Oxidizer:** Oxygen, nitrous oxide, medical air
- **Ignition Source:** Electrocautery, lasers, fiber optics, drills

💡 If one element is removed, a fire cannot start.



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Common Causes of Surgical Procedural Fires

Electrosurgical Units (Cautery)

Sparks can ignite drapes or alcohol - based prep.

Alcohol -based skin preps

Can pool and create flammable vapors.

Malfunctioning equipment

Overheated wires, frayed cords, or defective light sources.

Laser Use

Can ignite patient drapes or oxygen sources.

High oxygen concentration

Fuels combustion in facial, neck, and airway procedures.

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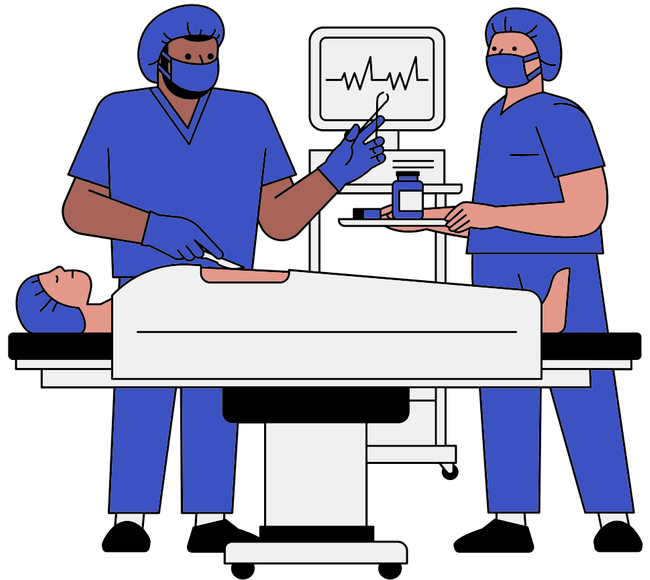
What 3 elements are needed to start a fire in the surgical setting?

A. Oxygen, heat, ignition

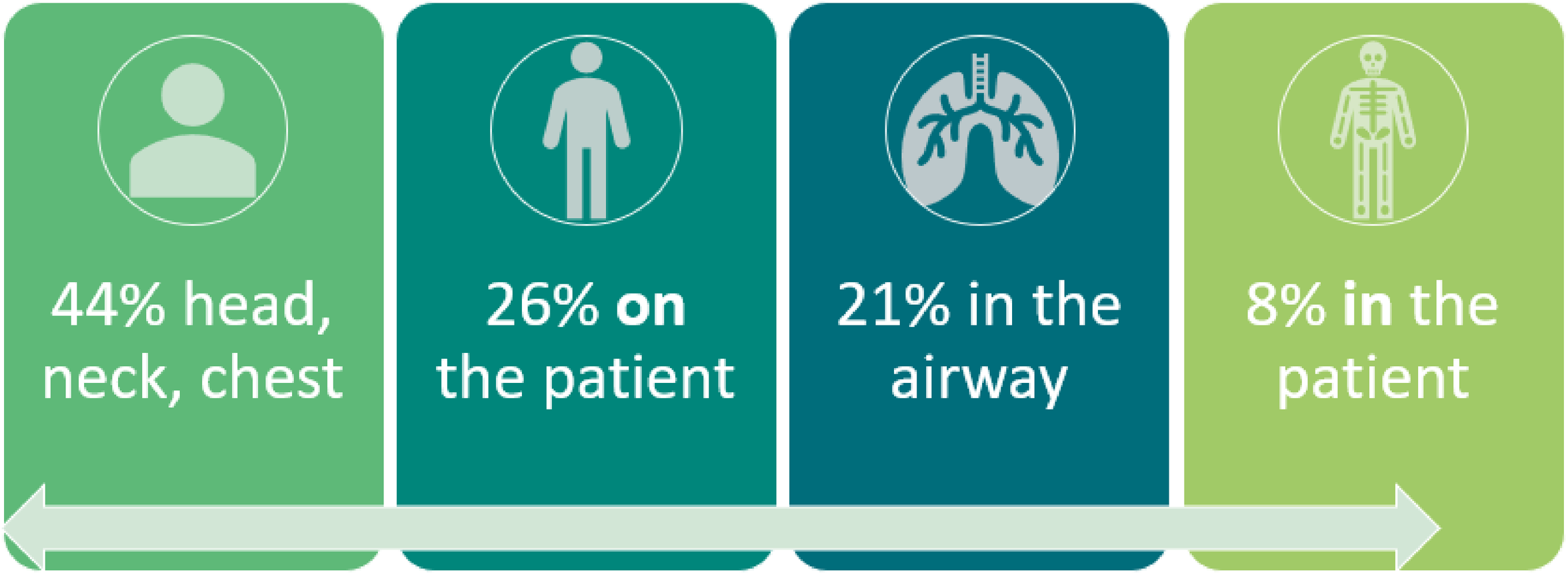
B. Oxygen, fuel, ignition

C. Heat, water, friction

D. Fuel, static, air



Surgical Fire Sites



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Fire Prevention Measures

- Monitor for potential fire hazards & take action to prevent of correct them.
- Tag defective electrical equipment and remove it from service.
- Keep hallways and fire exits clear for easy movement.
- Store flammable liquids in flame -proof cabinets.

Ignition Sources

Heat and Ignition Sources

Precautions for Ignition Sources:

- Sterile drapes should not cover heat/ignition sources (e.g., electrosurgery)
- Moisten sponges with saline when near ignition sources.
- **Laser safety:** Refer to Laser Safety LMS and policy for handling lasers.

Electrosurgery Unit (ESU) Safety

Dispersive Electrode Placement

- Apply the dispersive electrode to a clean, dry, muscular, hair -free site as close to the surgical site as possible.

Active Electrode Tip Safety

- Never place the active electrode tip directly on the patient.
- Place the active electrode tip in the protective holster when not in use to prevent accidental activation.

Cleaning the Electrode Tip

- Never use dry gauze to clean the active electrode tip.
- Use wet gauze or a cautery cleaning pad for safe cleaning.

Fiber -optic Light Sources Safety

Complete Connections Before Activation

- Ensure all connections are complete before activating the light source.
- Activated light sources can ignite combustible materials.

Turn Off When Disconnected

- Turn off the light source if the scope must be disconnected.

Use Adequate Light Levels

- Avoid over -illumination – only use the light intensity needed for adequate viewing.

Standby Mode for Inactivity

- Place the light source into standby mode when not in use to prevent ignition.

Defibrillator Safety

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Oxygen Safety

- Remove all oxygen sources before defibrillation
  - Includes masks, nasal cannulas, breathing circuits, and resuscitators delivering O_2 > 21%.

- Do not leave O_2 devices near patient or bed during shock.
  - Even inactive devices can maintain high oxygen levels and create a fire hazard.

Resuscitation Priority

- Fire risk precautions must not delay or interfere with life-saving resuscitation efforts.

Preventing Arcing

- Apply paddles firmly for full skin contact.

- Place EKG electrodes far from paddle sites.
  - Never place paddles on top of EKG wires or electrodes.

- Use non-expired, wet gel pads that are larger than the paddle face.

Ref. 930815
NDC 54365-400-38

BD ChloraPrep™
Hi-Lite Orange™
26 mL Applicator
2% w/v chlorhexidine gluconate (CHG) and 70% v/v isopropyl alcohol (IPA) Patient Preoperative Skin Preparation
Sterile Solution
Applicator is sterile if package is intact

Hi-Lite Orange™

⚠WARNING
FLAMMABLE

Keep away from fire or flame.
To reduce risk of fire, PREP CAREFULLY:
- do not use 26-mL applicator for head and neck surgery or on an area smaller than 8.4 in. x 8.4 in. Use a smaller applicator instead.
- solution contains alcohol and gives off flammable vapors
- avoid getting solution into hairy areas. Hair may take up to 1 hour to dry. Wet hair is flammable.
- do not drape or use ignition source (e.g., cautery, laser) until solution is completely dry (minimum of 3 minutes on hairless skin; up to 1 hour in hair)
- do not allow solution to pool
- remove wet materials from prep area

Fuels

Managing Fuels in Procedural Areas

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Follow Manufacturer Guidelines

- Always refer to product instructions for antiseptics, prep agents, and hand scrubs.

Safe Use of Surgical Preps

- Allow waterless hand scrubs to fully dry to prevent ignition from static or sparks.
- Prevent pooling of antiseptic solutions:
  - Use absorbent towels or impervious pads under prep area.
  - Wick away excess solution with sterile towels.
  - Remove soaked materials

Managing Fuels in Procedural Areas

Allow Dry Time

Give prep solutions adequate time to dry and vapors to dissipate before:

- Draping
- Using cautery, lasers, or fiber -optic cables

Volatile Fuel Awareness

- Alcohol, acetone, etc., may take several minutes to vaporize and dilute into room air.
- Be cautious during GI procedures
  - flammable gases like hydrogen and methane may be present.

Oxidizers

Minimizing Oxygen Concentrations in High -Risk Procedures

Oxygen Basics

- **Oxygen is heavier than air** —it settles in **low areas** .
- Improper draping traps oxygen and creates a **fire - prone environment.**

Tip: Drape to **vent gases** , preventing buildup under the surgical field.

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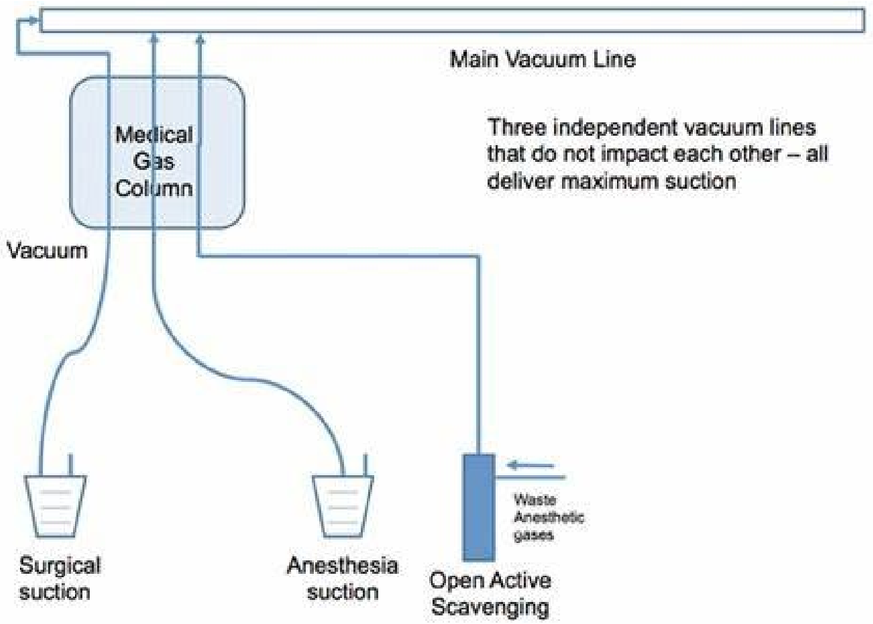
Minimizing Oxygen Concentrations in High -Risk Procedures

Monitoring & Blending Oxygen

- Use **anesthesia scavenger systems** for gas removal.
- Blend O_2 with air using common gas outlet for safer concentrations: for high-risk procedures
- Continuously monitor O_2 % with $ETCO_2$ to measure inspired/expired oxygen.
- Start at 30% O_2 concentration when applying supplemental O_2/air
  - Increase up to 40% only if needed.
- If patient can't tolerate 30–40% O_2 →Switch to **LMA or endotracheal tube.**

Minimizing Oxygen Concentrations in High -Risk Procedures

Avoid High -Risk Combustibles



- Avoid **nitrous oxide** during high -risk procedures.
- Use **cuffed** ET tubes for cases in/around the airway
- For airway cases:
  - **Insufflate with medical air**
  - **Scavenge with metal suctioning instrument**
  - Replace **desiccated soda -lime** to prevent internal heating

Fire Risk Assessment

Fire Risk Score

A risk assessment will be confirmed with all members of the OR/Procedure team during the time out.

A fire risk score of 1, 2, or 3 will be assigned to each patient based on the following:

Criteria	Yes	No
Surgery above the xiphoid	1	0
Open Oxygen Source	1	0
Available ignitions source	1	0

Fire Risk Score

1

Score 1 (Low Risk):

Standard draping proceudres, protect heat sources, & observe prep drying time

2

Score 2 (Low Risk, Potential for High Risk):

Standard draping procedures, protect heat sources, observe prep drying time, & may convert to high-risk precautions at any time

3

Score 3 (High Risk):

Occlusive draping procedure, maintain low FIO2, stop oxygen when using electrocautery, use wet sponges, and observe prep drying time

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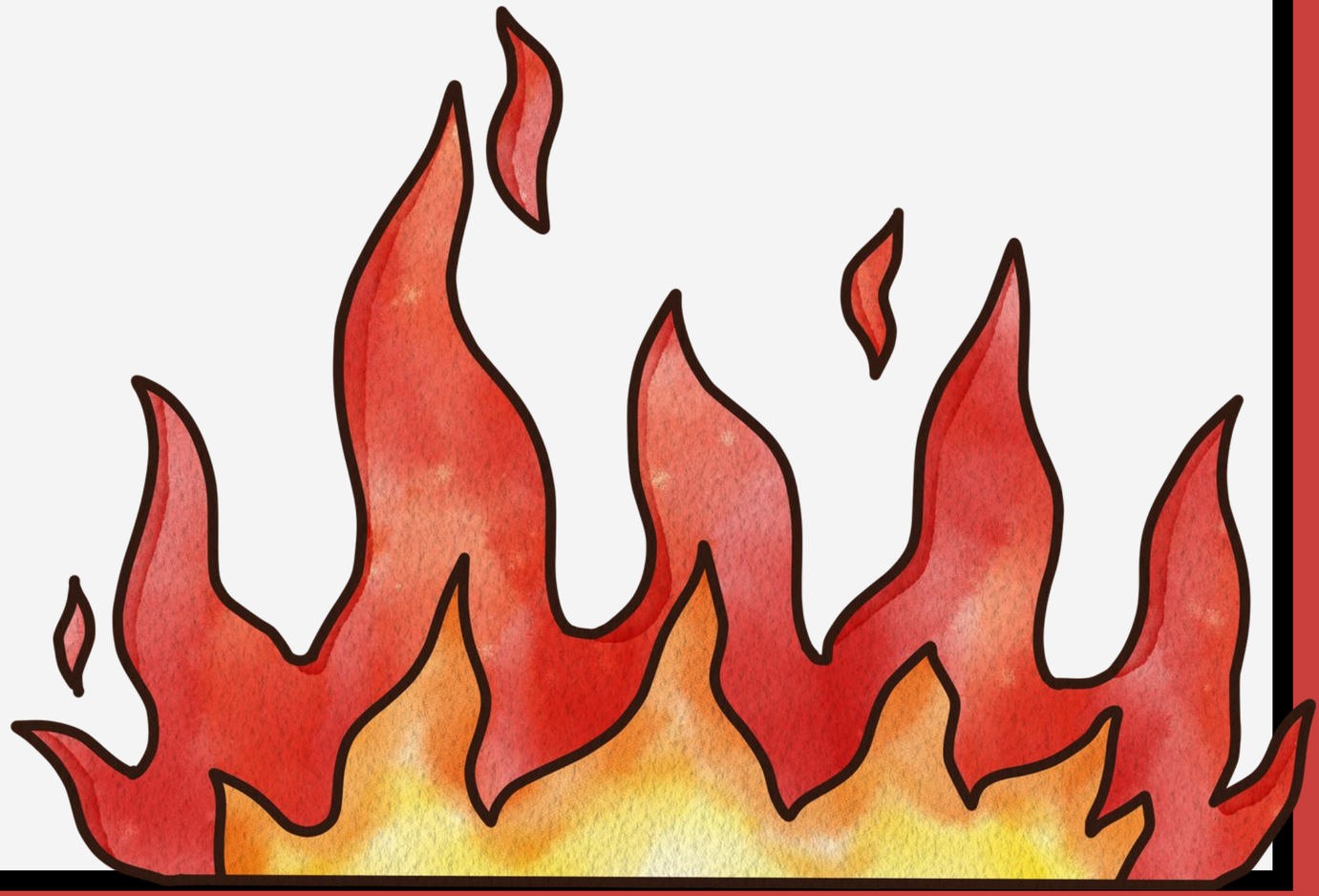
🔥 Fire Risk Score = 3

🚨 HIGH RISK: Extra precautions required

- **Observe Prep Drying Time**
- **Use Occlusive Drapes**
- **Start with Low FiO_2 (30 –40%)**
- **Cautery + Open Oxygen = Risk**
  - Stop oxygen flow at least 1 minute before and during cautery use.
- **Use Wet Sponges**
- **Have Sterile Water/Saline Ready**
- **Saline Syringe at Hand: Oral Cavity Procedures**
- **Protect Heat Sources**
  - Keep cautery tips and light cables covered when not in use.
- **Minimize Cautery Settings**
  - Use the lowest effective setting to reduce ignition risk.
- **Apply Water -Based Ointment to Hair**

Managing Fires



What fire risk score indicates a high -risk situation that requires enhanced precautions?

- 1
- 2
- 3
- 0

Using a Solution to Extinguish a Fire

- Use a nonflammable liquid such as saline or water.
- Aim at the base of the fire.
- Remember: drapes may be impermeable.

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How to Smother a Fire

Hold towel between the fire and the patient’s airway

Drop the end of the towel closest to the patient’s head

Drop the other end of the towel over the fire

Sweep hand over the towel from the patient’s head toward their feet. DO NOT PAT!

Raise the towel & keep your body away from the fire.

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National Fire Protection Association (NFPA) Fire Classification

A		Ordinary Combustibles	Wood, Paper, Cloth, Etc.
B		Flammable Liquids	Grease, Oil, Paint, Solvents
C		Live Electrical Equipment	Electrical Panel, Motor, Wiring, Etc.

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If it’s safe to extinguish the fire, use the PASS method:

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Fire in the Hospital:

Code Red Protocol

Immediate Actions During A Code Red

Alert Notification

- Staff will be notified via hospital -specific alert system that a “Code Red” is in progress.

Transport Restrictions

- No patients will be transported to or from the Surgery Department until the “All Clear” signal is given.

Procedure Suspension

- No new procedures will be started during a Code Red.

Ongoing Communication

- Physicians and staff will be updated with developments related to the Code Red.

Elevator Use Prohibited

- Elevator use is prohibited. Use stairs only if necessary.

Stay in the Department

- All personnel must remain in the department until the “All Clear” signal is given.

DMS: Fire Action Plan in the Surgical Procedural Areas

If a fire occurs, follow the RACER protocol

RACER Protocol

R - Rescue: Remove the patient from the immediate danger if possible

A - Alarm: Alert the OR team and activate the fire alarm

C - Contain: Turn off medical gases, remove drapes, and close doors

E - Extinguish: Use the appropriate fire extinguisher

R - Relocate: Relocate to a safe area

What is the first step when a fire occurs in the operating room?

Extinguish or remove burning materials/drapes (if they are unable to be extinguished)

Evacuate the patient

Call 911

Run to get a fire extinguisher

Fire in the Surgical Procedural Room

Immediate Actions & Assigned Roles

Circulating Nurse: Incident Leader

- Remove burning drapes and extinguish flames.
- Unplug all electrical equipment.
- Keep doors closed unless evacuation is necessary.
- Notify control desk of fire location/severity.
- If phone/intercom isn’t available, send a runner.
- Ensure nearest fire pull station is activated.
- Know evacuation routes & give relocation instructions.
- Close main medical gas valves.

Charge Nurse

- Activate fire pull station near control desk.
- Call operator with fire location & severity.
- Confirm all fire doors/exits are secure.
- Keep nearby ORs informed and on hold.
- Coordinate with fire department.
- Prepare for full OR evacuation if ordered.

DMS: Fire Action Plan in the Surgical Procedural Areas

Fire in the Surgical Procedural Room

Immediate Actions & Assigned Roles

Anesthesia Provider

- Shut off all gases and the anesthesia machine.
- Turn off backup O_2 tank.
- Resume ventilation or secure airway.
- Assist physician in evaluating and treating injuries.

Surgeon

- Pack or close wound, cover with sterile towels.
- Douse area with cold saline.
- Treat injuries and assist with patient transport.
- Participate in patient disclosure process.

Fire in the Surgical Procedural Room

Immediate Actions & Assigned Roles

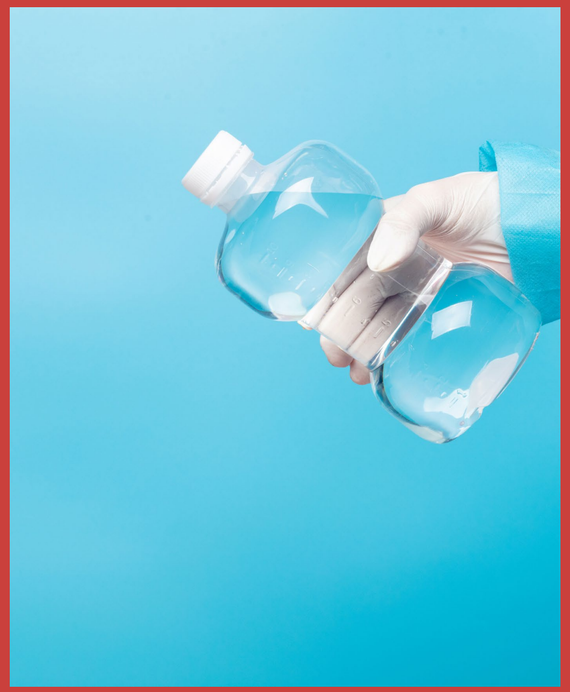
DMS: Fire Action Plan in the Surgical Procedural Areas

Scrubbed Staff Member

- Remove ignition sources (cautery, laser).
- Apply sterile saline if fire is non -electrical.
- Prep essential instruments and dressings for transport.
- Assist surgeon with moist wound packing.
- Help transport the patient.

Att endants & Core Technicians

- Clear hallways and fire exits.
- Bring stretcher or patient carrier.
- Assist with transport.
- Know fastest evacuation routes.
- Stay available for Circulator instructions.

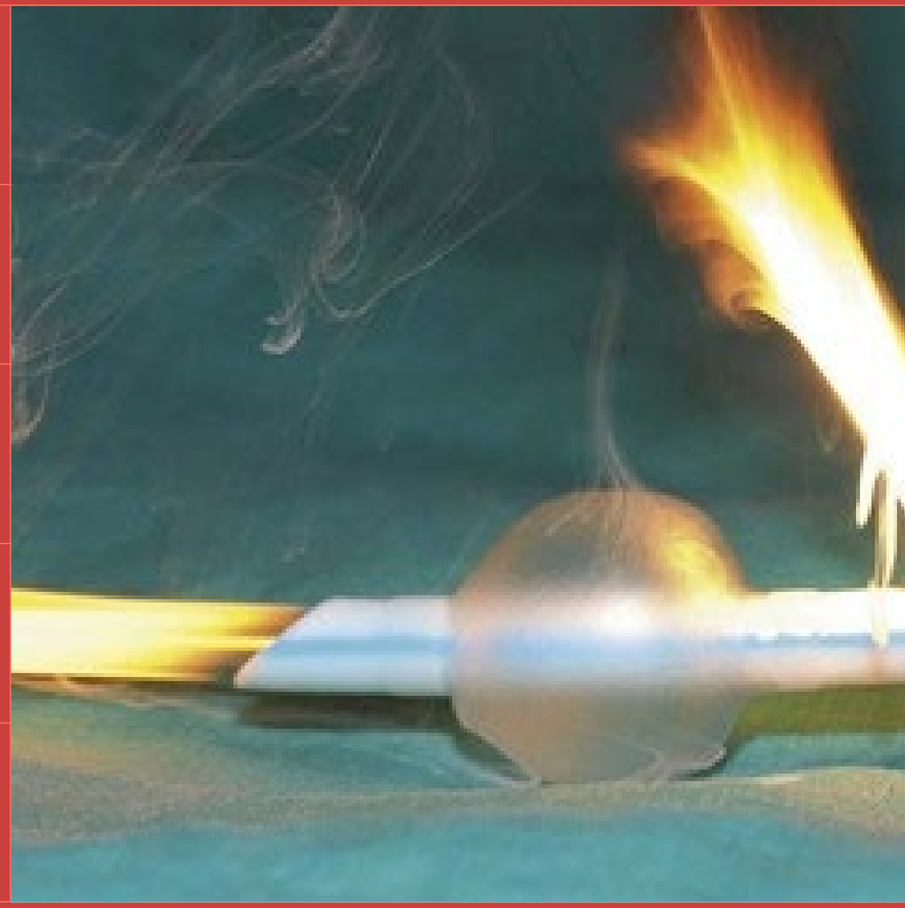


Fire ON a Patient

- Turn off all oxygen and gasses.
- Extinguish burning materials (drapes, equipment) using water or CO2 extinguisher.
- Cool the tissues with sterile saline.
- Transport the patient to a safe area.

Airway Fire Protocol

1	Anesthesia: removes breathing circuit from ET tube and removes tube from airway
2	Extinguish tube
3	Pour saline or water into airway: extinguish embers & cool tissue
4	Reestablish airway, resume ventilating with air, then switch to 100% oxygen
5	Examine airway to determine extent of damage



DMS: Fire Action Plan in the Surgical Procedural Areas

Fire Involving Team Member

If unable to remove burning gown/clothing remember to “Stop, Drop, and Roll."

Stop: Stand still.

Drop: Drop to the ground.

Roll: Roll back and forth to smother the flames.

What should be poured into the airway after removing a burning endotracheal tube?

Sterile alcohol

Sterile saline or water

Hydrogen peroxide

Nothing - it should remain dry

Evacuation Procedures

Evacuate to a nearby safe area (e.g., PACU, clinical area adjacent to the OR/procedure room).

Ensure patient chart and perioperative records are taken.

Follow evacuation routes to maintain staff and patient safety.

DMS: Fire Action Plan in the Surgical Procedural Areas

What Happens After a Fire?

Post-Fire Protocol

Document the event: Fill out safety reports and/or report to Sentinel Event team.

Preserve evidence: Save all involved materials for investigation.

Facilitate disclosure: Surgeon discloses the incident to the patient/family.

Conclusion & Final Reminders

- Preventing Surgical Procedural fires starts with awareness and preparation.
- Always follow fire safety protocols to protect patients and staff.
- Report any fire hazards or faulty equipment immediately.
- Stay informed – annual fire safety training is required!

What is the first step in the RACER protocol?

A. Contain the fire

B. Rescue the patient

C. Relocate to a safe area

D. Extinguish the fire

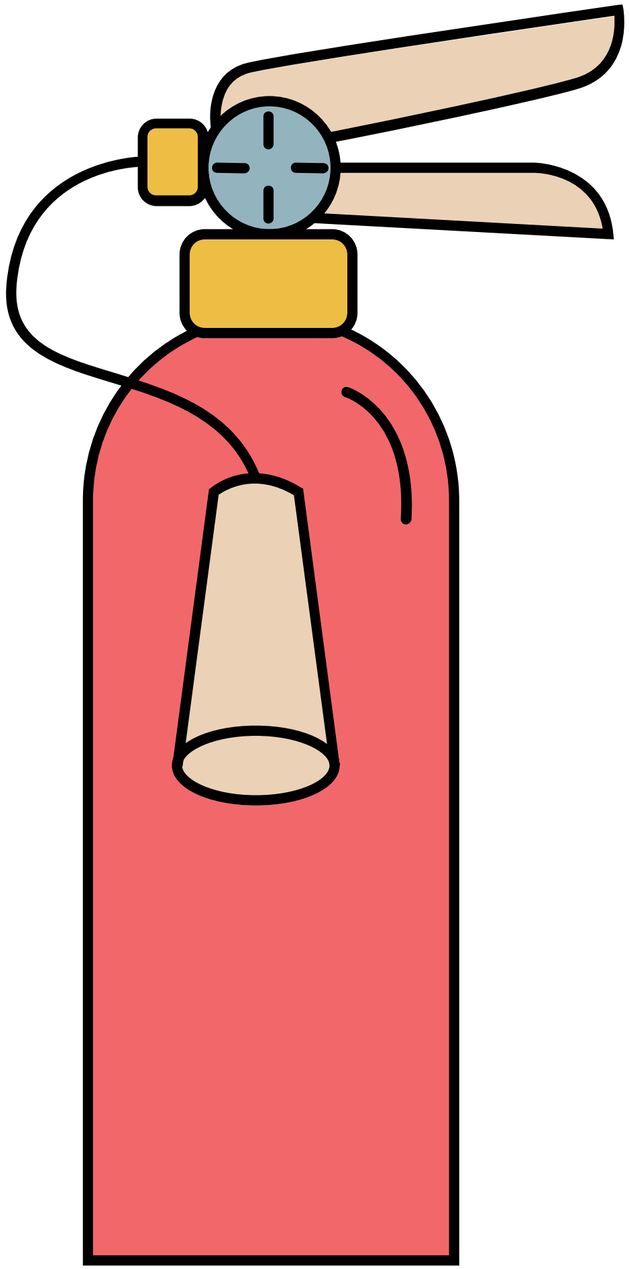
Which fire extinguisher should be used for electrical fires?

A. Water-based

B. CO_2 or Class C

C. Foam

D. Dry chemical



References

- **DMS:** Fire Action Plan in the Surgical Procedural Areas

- **AORN Guideline:** Environment of Care - Fire Safety
  - December 21, 2023

References

AORN Fire Safety PowerPoint

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