Surgical Fire Prevention Strategies

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Current Affiliations

National Fire Protection Association

American Society of Anesthesiologists

apsf

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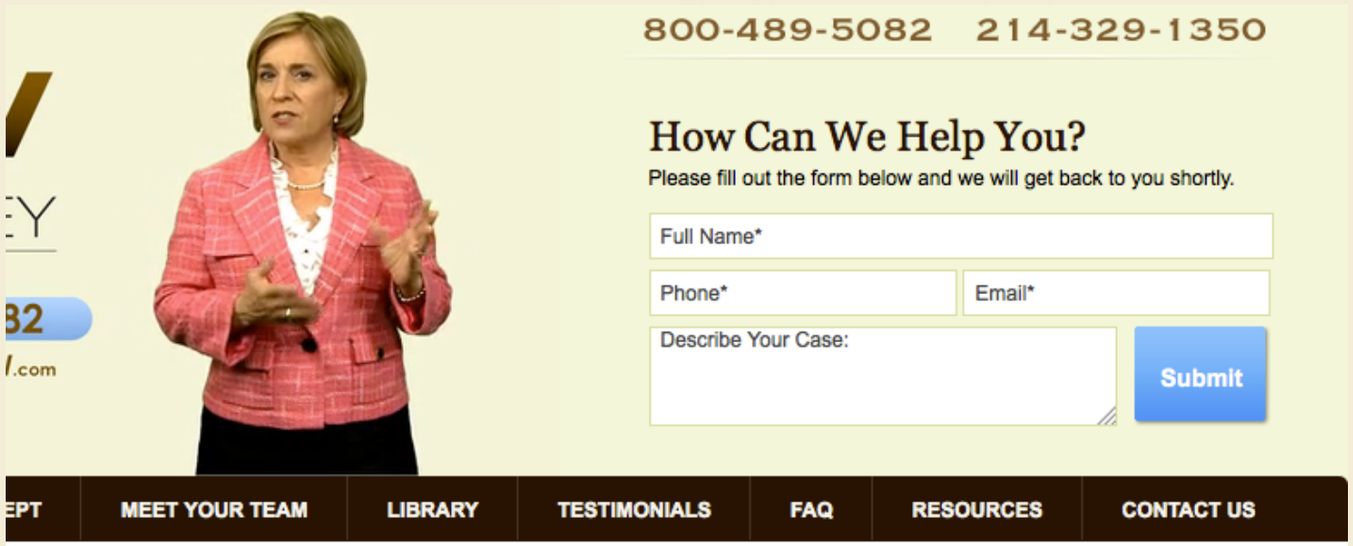
Who Else is Interested in OR Fires?



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Why *You* Should Be Interested in OR Fires

- **Nearly 100% Preventable**
- **Prevention Costs Little to Nothing**
- **Fires Result in Catastrophic Damages to the Patient**
- **Most Effective Means of Prevention is Communication Between Surgical Team Members**

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Issue

- **≈650 Surgical Fires occur per year (1:87,000)[1]**
- **Only one state (PA) has mandated reporting**
- **Actual number unknown, but is ~~likely~~ much higher**
- **Comparable to Wrong Site Surgery and Retained Foreign Objects**

[1] ECRI New clinical guide to surgical fire prevention [guidance article]. *Health Devices* 38 (10):10/2009

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Issue

- Closed Claims Information
  - 103 Claims (median $160,000)
  - Cautery involved in 90% of claims
  - 84% involved open delivery of oxygen (53% Cannula)
  - 81% during MAC Cases
  - 15% involved alcohol prep solution
  - Facial Plastic Surgery comprised 64%
    - Temporal Artery Biopsy (8%), CEA (3%), neck procedures (12%), PCM (6%)
  - 6% Death Related Claims

Issue

Open delivery of oxygen contributes to most surgical fires and any effort to reduce the occurrence of surgical fires must focus on changing the manner in which oxygen is used.

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With the Joint Commission and Hospital Fire Drills, I Should Know What to do, Right?

R emove everyone from fire area
A lert others and use pull station
C onfine fire by closing doors
E xtinguish or evacuate

P ull Pin on Extinguisher
A im at Base of Fire
S queeze Handle
S weep side to Side

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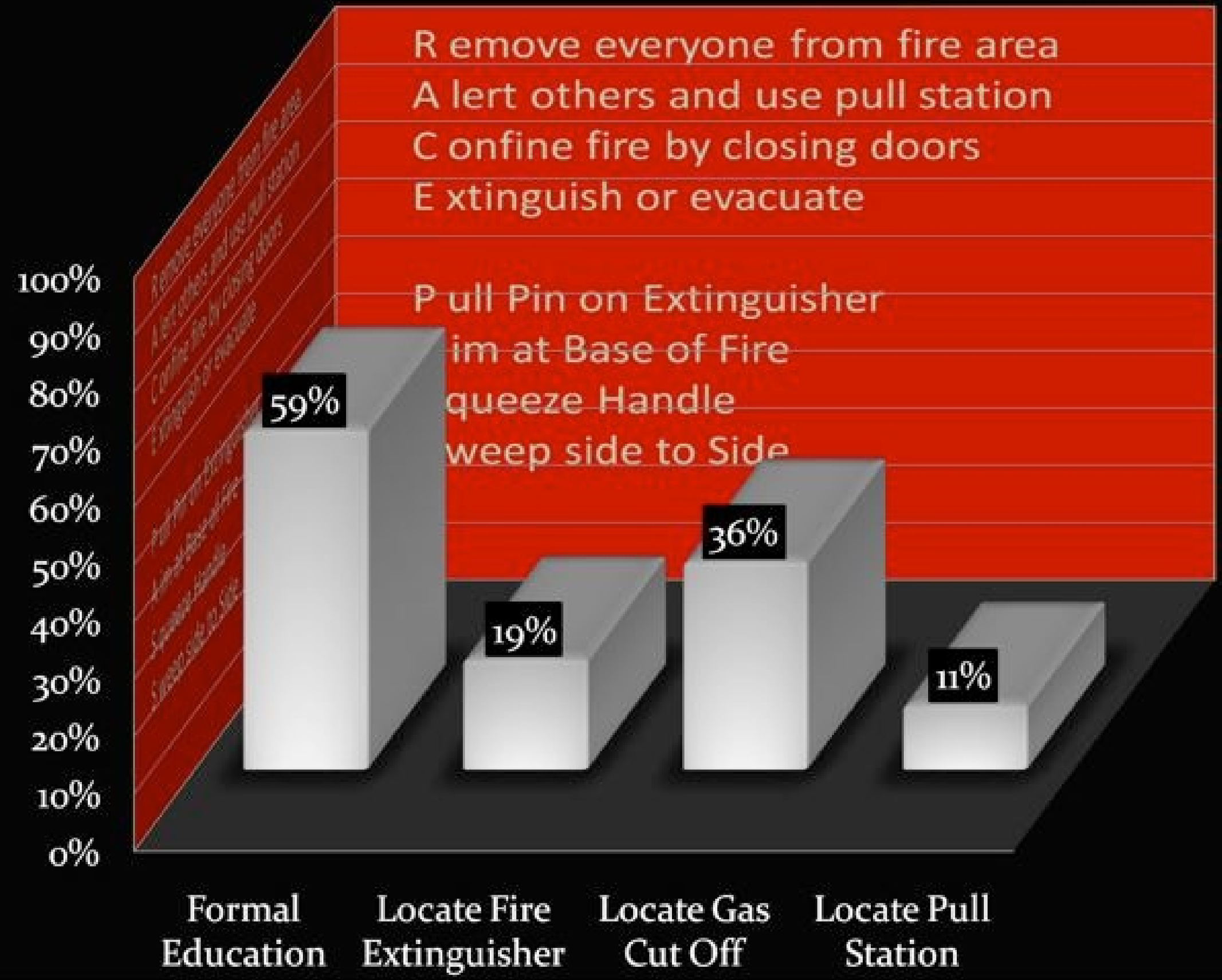
118 Regular Operating Room Personnel Were Asked The Following:

Have you had any formal education pertaining to the response of a fire in the operating room?

Where is the nearest fire extinguisher to our current location?

Where is the medical gas supply cut off for our current location?

Where is the nearest fire alarm pull station to our current location?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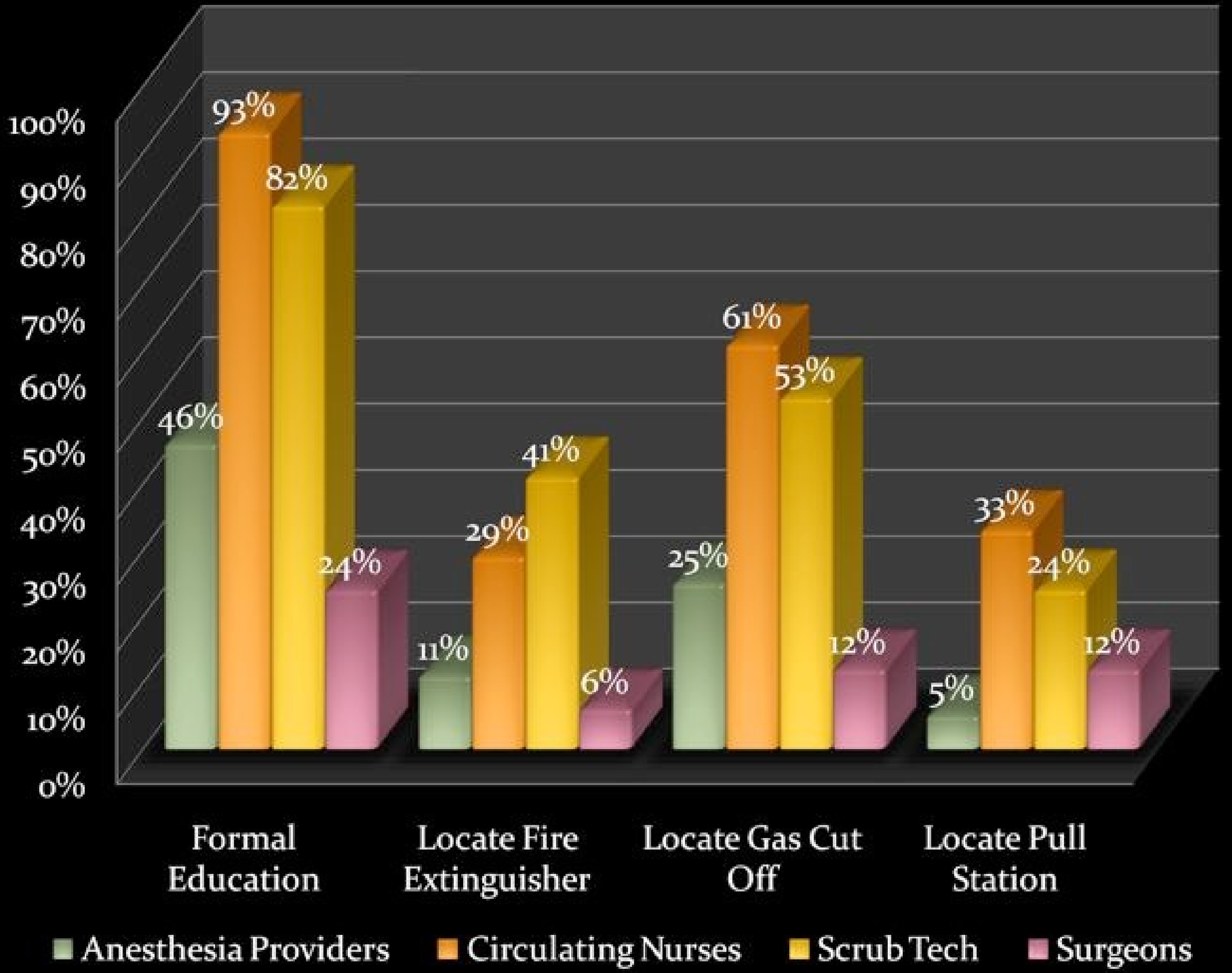
Formal Education
Locate Fire Extinguisher
Locate Gas Cut Off
Locate Pull Station
Operating Room Staff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5%
33%
24%
12%
Formal Education
Locate Fire Extinguisher
Locate Gas Cut Off
Locate Pull Station
Anesthesia Providers
Circulating Nurses
Scrub Tech
Surgeons

What’s the Fire Risk?

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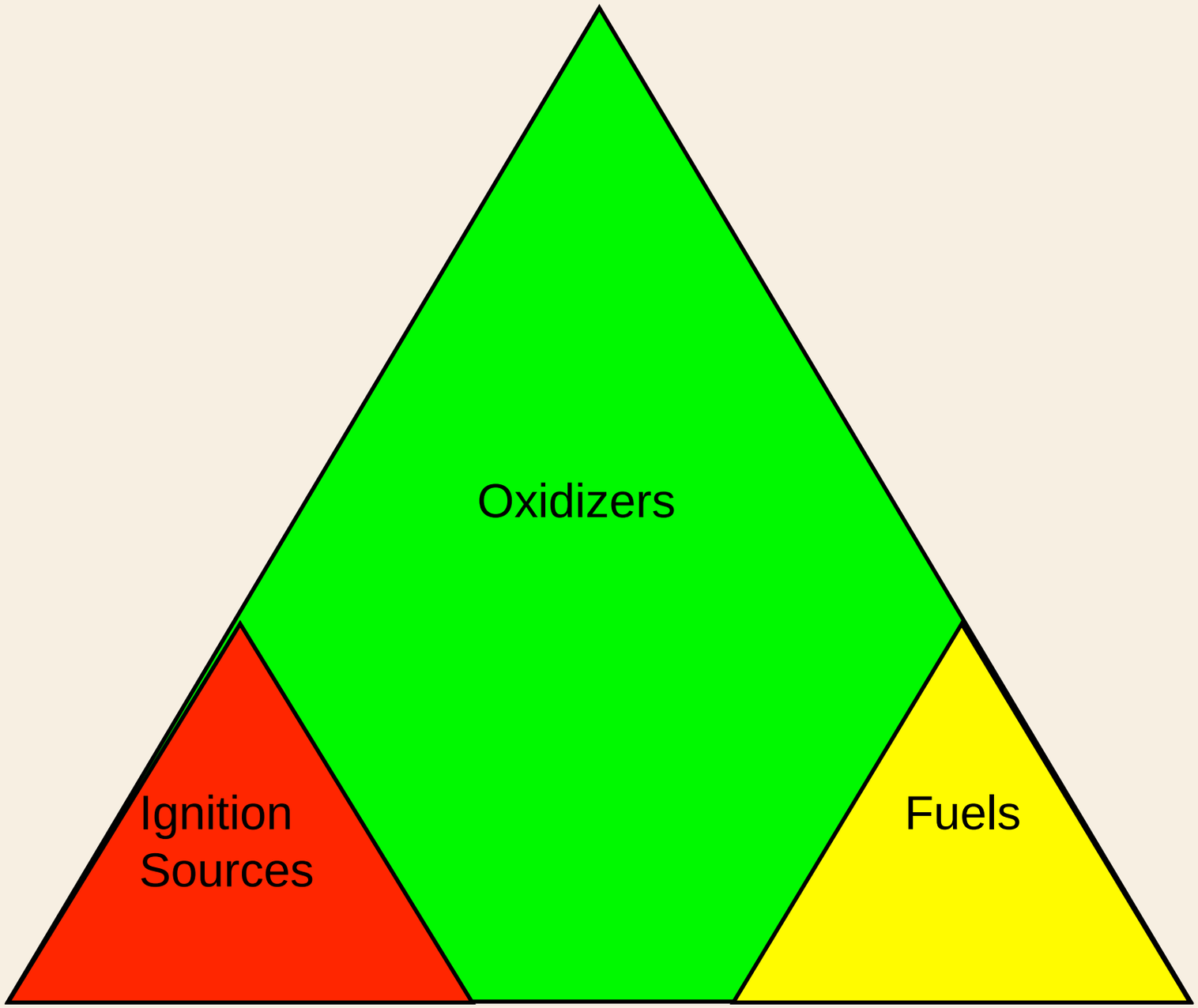
What’s the Fire Risk?



What’s the Fire Risk?

With 75% of surgical fires involving oxygen-enriched atmospheres the oxidizer risk should be emphasized more in the fire triangle.

Images: NASA

Preparation

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Surgical Safety Checklist

	Verify	Discuss
Patient Entry to OR **Anesthesia Professional** Circulating Nurse Patient	☐ OR is quiet and focused ☐ Correct patient with 2 identifiers ☐ Health information systems open and match patient ☐ Posted procedure, side, site, and position matches marking and consent ☐ Allergies ☐ Anesthesia machine checked	☐ Anesthetic plan ☐ If difficult airway, plan for management including equipment availability ☐ Plan for patient warming ☐ Availability of blood products
Prior to Incision and Service Change **Attending Surgeon** Circulating Nurse Anesthesia Professional OR Team	☐ OR is quiet and focused ☐ All team members state name and role ☐ Correct patient with 2 identifiers ☐ Health information systems open and match patient ☐ Preop anesthesia/medical recommendations reviewed ☐ Agreement on the procedure to be done, side, site, marking and position ☐ Administration of antibiotics and redosing plan ☐ VTE prophylaxis measures ☐ Surgical fire risk assessment ☐ Necessary implant(s) and equipment available	☐ Surgical plan including duration of procedure, potential difficulties, bleeding risk, anticipated recovery destination ☐ Anesthesia plan including potential airway difficulties, availability of blood products ☐ Emergency action plans ☐ Nursing plan and concerns ☐ Surgeon states: "If you see something that concerns you during this case, please speak up."
Prior to Wound Cavity Closure and Service Change **Attending Surgeon** OR Team	☐ Inspection of wound cavity for retained objects	☐ Sponge, needle and miscellaneous counts
Prior to Surgeon Leaving OR **Circulating Nurse** Attending Surgeon Anesthesia Professional OR Team	☐ Sponge, instrument, needle counts correct ☐ Final procedure documented ☐ Wound classification confirmed ☐ Specimens labeled, read back, sent ☐ Pathology request signed by surgeon ☐ Responsibility for Brief Op Note and Post Op orders assigned	☐ Equipment malfunctions or concerns ☐ Recovery destination and management concerns ☐ Ways to improve safety or efficiency

v12 / June 12, 2013

Prevention

- **Configure drapes to prevent oxidizer accumulation or flow into surgical field**
- **Flammable skin preps should be dry before draping**
- **Moisten gauze and sponges if using near ignition source**
- **COMMUNICATE WITH ALL TEAM MEMBERS**
- **Pre-planning is key to a response. Each individual in room should know their role in case of fire for high risk situations.**

Prevention

- If concentration is reduced, allow time for change to occur.
- Nitrous Oxide is an oxidizer to an equal extent to Oxygen
- For Airway Surgery use a cuffed tube and scavenge the field.

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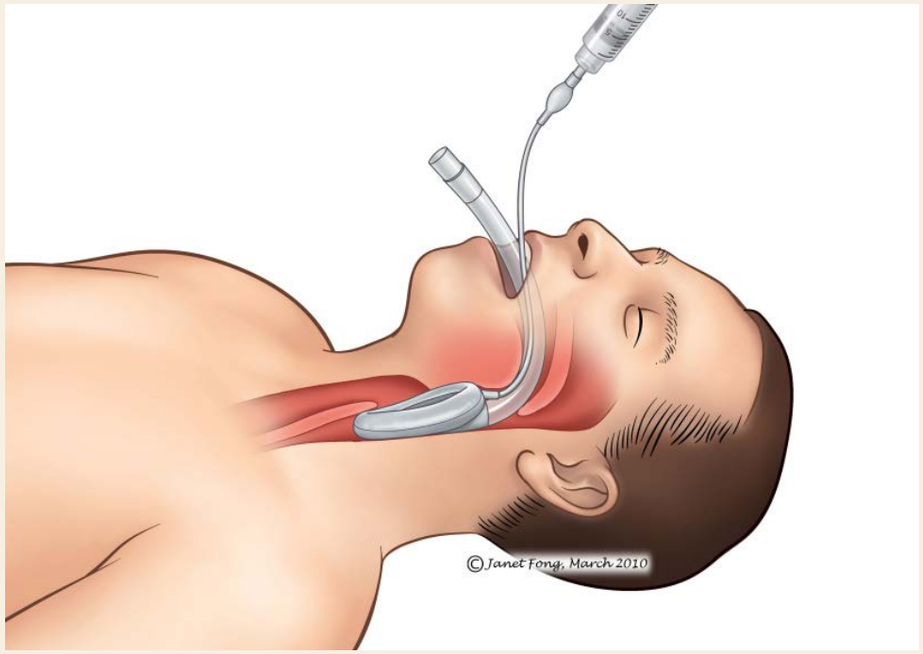
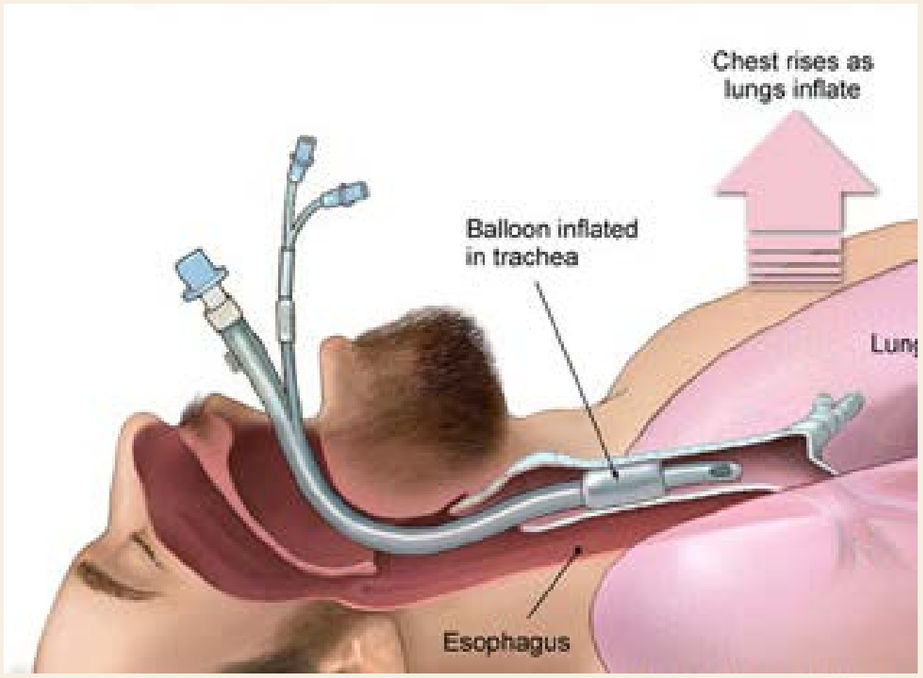
Prevention

Open delivery of oxygen should be avoided. Either use room air, an oxygen blender or secure the airway with endotracheal tube or supraglottic device.





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Management

- If you think there are signs of fire, stop the case and investigate!
- If fire is confirmed, announce the fire and halt procedure.
- For airway fires:
  - Stop gases
  - Remove the tube
  - ORDER NOT IMPORTANT
  - Pour saline or water into airway

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Management

- For non-airway fires
  - Turn off oxidizers
  - Remove drapes and burning material from patient
  - Extinguish burning materials with saline or water
- If initial attempt not successful
  - Use a CO2 or other non-chemical fire extinguisher
  - Implement your evacuation plan and shut off gas supply
  - Activate Fire Alarm
- Assess for Smoke Inhalation

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Take a Team Approach

Know Your Role in Preventing Surgical Fires

Silverstein Fire Risk Assessment Score

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

	Yes	No
Surgery above the xiphoid	1	0
Open oxygen delivery	1	0
Available ignition source *(cautery, laser, fiberoptic lightsource)*	1	0

3 = High Risk – Take steps to secure airway, avoid ignition source, and eliminate open delivery of high oxygen concentration. If these steps are not feasible, then establish specific plans to take in case of fire. Have extinguishing materials immediately available.
2 = Medium Risk – Low risk for fire, but assess for changes frequently
1 = Low Fire Risk

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APSF
Anesthesia Patient Safety Foundation

OR Fire Prevention Algorithm

Start Here

Is patient at risk for surgical fire?

Procedures involving the head, neck and upper chest (above T5) *and* use of an ignition source in proximity to an oxidizer.

NO → **Proceed, but frequently reassess for changes in fire risk.**

Nurses and surgeons avoid pooling of alcohol-based skin preparations and allow adequate drying time. Prior to initial use of electrocautery, communication occurs between surgeon and anesthesia professional.

YES

Does patient require oxygen supplementation?

NO → **Use room air sedation.**

YES

Is >30% oxygen concentration required to maintain oxygen saturation?

NO → **Use delivery device such as a blender or common gas outlet to maintain oxygen below 30%.**

YES

Secure airway with endotracheal tube or supraglottic device.

Although securing the airway is preferred, for cases where using an airway device is undesirable or not feasible, oxygen accumulation may be minimized by air insufflation over the face and open draping to provide wide exposure of the surgical site to the atmosphere.

Provided as an educational resource by the
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The following organizations have indicated their support for APSF's efforts to increase awareness of the potential for surgical fires in at-risk patients: American Society of Anesthesiologists, American Association of Nurse Anesthetists, American Academy of Anesthesiologist Assistants, American College of Surgeons, American Society of Anesthesia Technologists and Technicians, American Society of PeriAnesthesia Nurses, Association of periOperative Registered Nurses, ECRI Institute, Food and Drug Administration Safe Use Initiative, National Patient Safety Foundation, The Joint Commission

How the fire service can lead the effort in surgical fire prevention

- **Befriend an OR Staff Member**

How the fire service can lead the effort in surgical fire prevention

- Befriend an OR Staff Member
- Encourage and arrange for OR specific fire drills

Good PR

Staff jumps into action during drill

By Brandon Evans | Published Saturday, November 23, 2013

How do you respond to an emergency during an already life-threatening situation?

Thursday afternoon, on the third floor of Wise Regional Health System (WRHS) in Decatur, doctors and nurses were operating on a patient in a sterile operating room. An employee noticed an autoclave sparking in what appeared to be a small electrical fire.

CLIMBING TO THE TOP – Decatur firefighter Alex Brown climbs the stairs to the third floor at Wise Regional Health System during a drill Thursday. Messenger photo by Joe

How the fire service can lead the effort in surgical fire prevention

- Befriend an OR Staff Member
- Encourage and arrange for OR specific fire drills
- Use OR fire drill to pre-plan and consider first responder hazards

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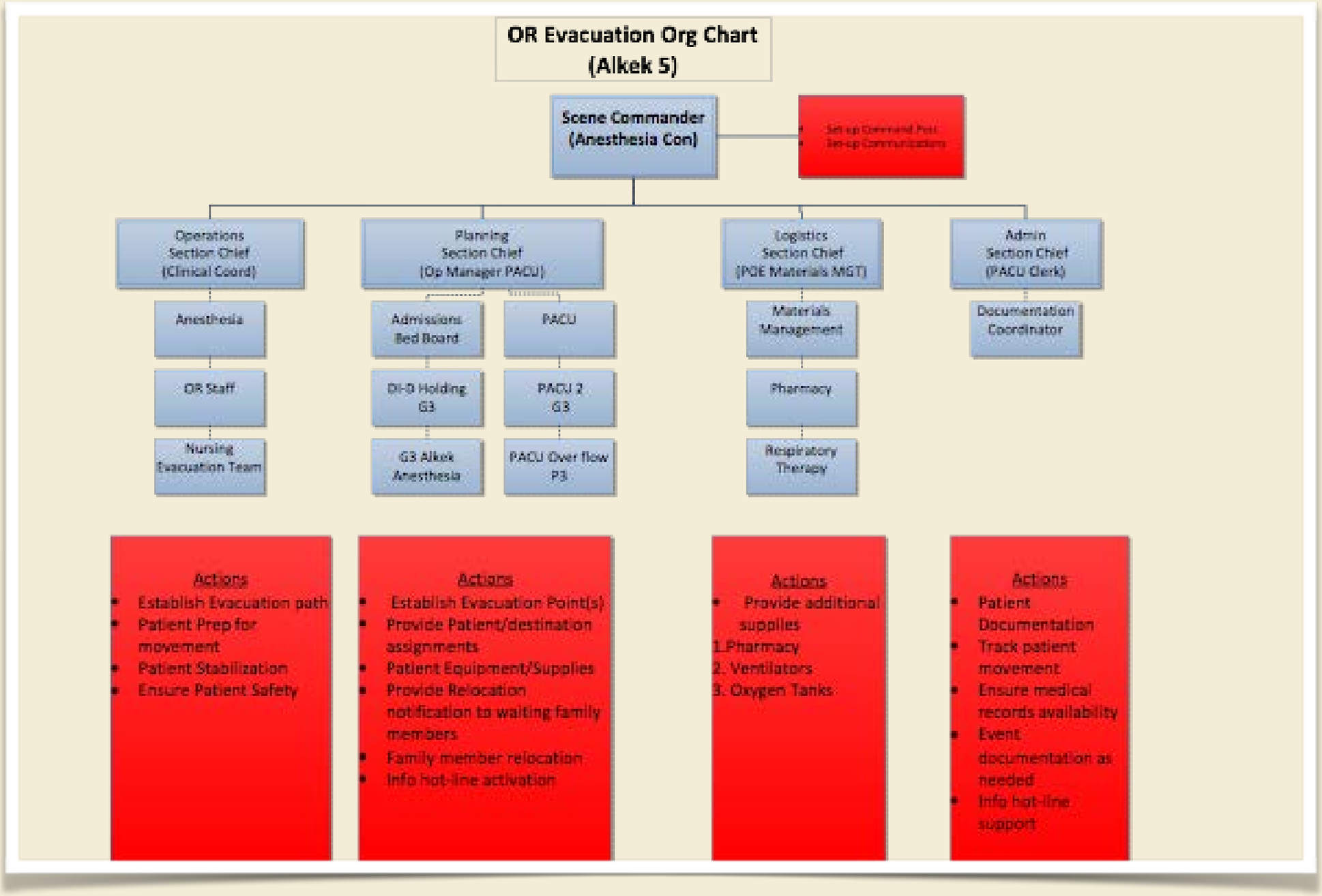
A little pre-planning goes a long way



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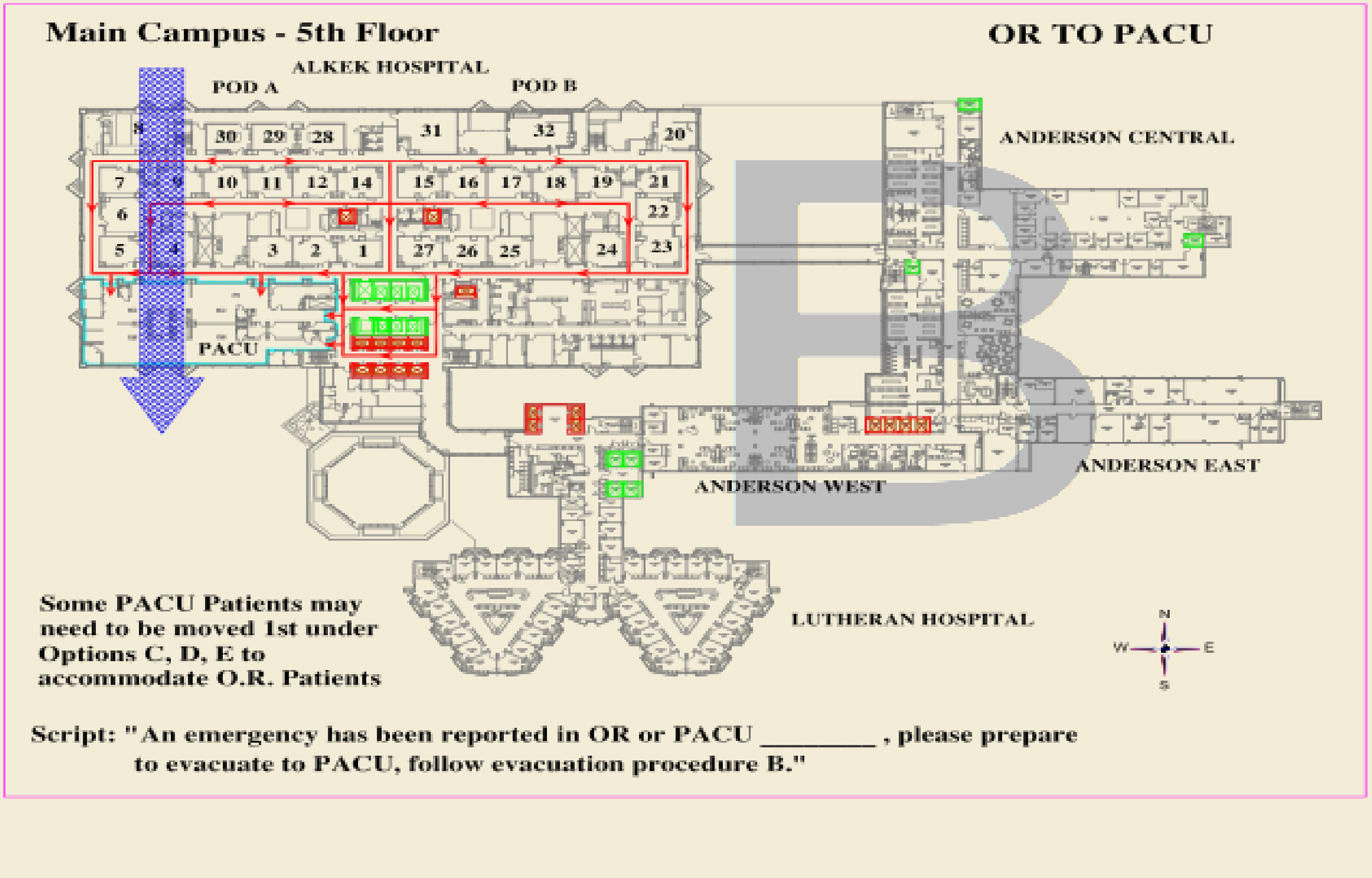

Things you might not think about

- Large
- 38 ORs in main facility including iMRI
- 6 ORs in Ambulatory Care Center
- 14 Other Anesthetizing Locations
- In main OR about 350 people in the suite at 8:00 AM
- Command Point
- Administratively isolated from rest of the hospital

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How the fire service can lead the effort in surgical fire prevention

- Befriend an OR Staff Member
- Encourage and arrange for OR specific fire drills
- Use OR fire drill to pre-plan and consider first responder hazards
- Educate hospital staff about importance of communication

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How the fire service can lead the effort in surgical fire prevention

- Befriend an OR Staff Member
- Encourage and arrange for OR specific fire drills
- Use OR fire drill to pre-plan and consider first responder hazards
- Educate hospital staff about importance of communication
- Educate hospital staff about hazards of open delivery of oxygen

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Open Delivery of Oxygen

- Most common root cause of surgical fires
- The principles of a flash fire are misunderstood by most

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