

# Surgical Fire Prevention Reducing the Risk!

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# Objectives

- Upon Completion of this webinar, the participant will be able to:
  - Identify the locations where a surgical fire may occur
  - Identify the three components of the fire triangle
  - Best practices for surgical fire interventions





# Surgical Fire Facts

- Estimated 550 to 650 surgical fires occur in the US each year
- Occur in head, neck & chest type surgeries
- May involve the airway
- 70% ignited by electrocautery devices
- 20% started because of light sources, wires & defibrillators
- 10% are sparked by lasers





# Surgical Fires

- Can occur anywhere
  - Ambulatory surgery center
  - Physicians' offices
  - Hospitals
  
- Occur in, on or around a patient who is undergoing a medical or surgical procedure
- Occur within the “Fire Triangle”
- Under reported
- HAC and Never Event
- Root Cause is well known



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# Surgical Fires

- Patients experience
  - Injury to head, neck & chest area
  - Burns
  - Pain
  - Disfigurement
  - Death
  
- Preventable.....yet still occur!





# Surgical Fires Reported by Procedure

- Cervical conization
- Cesarean section
- Facial surgery
- Infant surgeries (eg, patent ductus arteriosus)
- Oral surgery
- Pneumonectomy
- Tonsillectomy
- Tracheotomy



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# Highest Risk for Surgical Fire

- Procedures performed above the xiphoid process & in the oropharynx carry the greatest risk
  - Tonsillectomies
  - Tracheotomies
  - Removal of laryngeal papilloma
  - Burr hole surgery
  - Adeno-tonsillectomies
  - Lesion removal on the head, neck or face
  
- Why: Anesthesiologist have tendency to give patients more oxygen than necessary



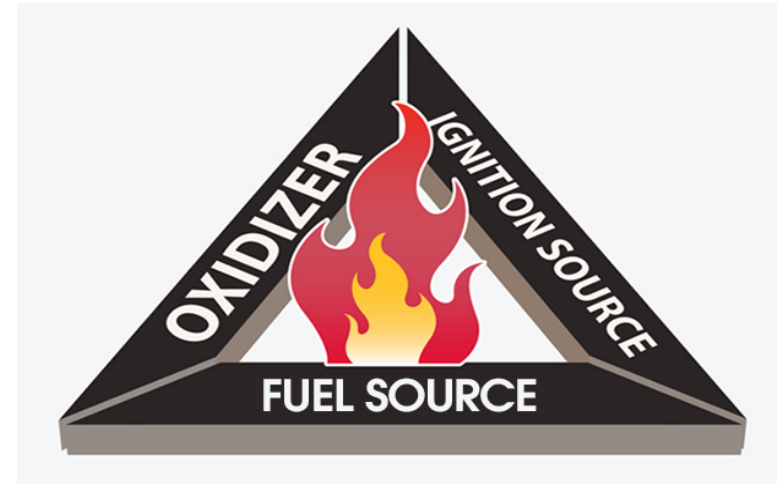
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# How Do Surgical Fires Happen?

- All 3 elements of fire triangle are present
  - Ignition source
  - Fuel source
  - Oxidizer
- Exist in almost every surgical situation





# Ignition Sources

- Anything in the OR that can spark a fire
- When Oxygen and a fuel source are present
- Sparks are given off by the sources
- Produce temperatures several hundred to a few thousand degrees
- Surgeon controls the heat source



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# Ignition Sources

- Overhead surgical lights
- Defibrillators
- Electrosurgical or electrocautery units
- Heated probes
- Power tools-Drills or burs
- Fiber-optic light sources and cables
- Lasers
- Magnets
- MRI machines
- Overheated IV solutions
- Blankets warmed in heating cabinets



# Fuel Sources

- Anything that is flammable
- Almost everything that comes in contact with patients in the O.R.
- Patient is considered a fuel source
- In an oxygen risk environment
  - Even things that are not considered to be flammable can ignite & burn
- Nurses/Circulator/Scrub Tech control fuel sources



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# Fuel Sources

- Preparation solutions
- Sponges
- Drapes
- Towels
- Hoods
- Masks
- Anesthesia circuits
- Dressings
- Ointments
- Patient's hair
- Patient's tissue
- Patient's GI content



# Fuel Source Examples

- Surgical drapes placed in a way that allows oxygen to pool under them
- Liquid alcohol
  - From a wet dripping prep
  - Pools under the patient
  - Generates vapors that can ignite
- Alcohol based sterilizers
  - Can ignite if not given sufficient time to dry



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# Oxidizers

- Supplied by the Anesthesiologist
  - Monitors the amount of oxygen given to patient
  - Minimize the amount of oxygen used
  - Standard procedure if more oxygen is needed
    - Secure airway and mask placed over the airway
    - Prevent oxygen from venting under drapes





# High Risk



**ROOM  
AIR  
In the  
O.R.**







# Misleading Beliefs

- When surgical fires occur
  - Healthcare provider will suggest equipment failure was the cause
- ECRI Institute
  - Cause is Misuse of the equipment

**Disaster = Human Complacency + Fuel + Oxygen + Heat**





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# Fire Prevention is a Team Effort

- Include all surgical team members
  - Anesthesia delivering medical gases
  - Surgeon controlling the ignition source
  - OR staff applying skin preparation agents and drapes
  - Additional OR staff
  - EVS Staff





# Surgical Fire Risk Assessment

- Conduct assessment prior to surgery
  - Be aware of high risk procedures
  - Possible ignition source
  - Delivery of supplemental oxygen
  - Use of an ignition source near the oxygen



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# Surgical Fire Risk Assessment Tool

## Conduct on every patient

Is an alcohol-based prep agent or other volatile chemical being used preoperatively?	Yes	No
Is the surgical procedure being performed above the xiphoid process?	Yes	No
Is open oxygen or nitrous oxide being administered?	Yes	No
Is an ESU, laser or fiber-optic light cord being used?	Yes	No
Are there other possible contributors?	Yes	No





# Universal Protocol

- Include surgical fire risk in “Time Out” process
  - Fire Risk Assessment Score
    - 3 or > Implement high risk prevention measures
    - 0- 2 Implement routine prevention measures
  - Team discussion on how a fire will be prevented and managed
  - Ensure documentation in EMR



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# Safe Use and Administration of Oxidizers

- Evaluate the need for supplemental oxygen
  - **Increased oxygen = increased fire risk**
- Titrate to the minimum concentration
- Used closed oxygen delivery system
- If using open oxygen system take precautions to exclude oxygen and flammable/combustible gases from operative field.





# Safe Use and Administration of Oxidizers

- Tent drapes to allow for free air flow
- Use an adhesive incise drape
- Evacuate any surgical smoke from small or enclosed spaces
- Turn off the O2 at end of each procedure



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# Safe Use of Possible Ignition Source Devices

- Consider alternatives to using ignition source for high risk surgeries if delivering high concentrations of supplemental oxygen.
- If using ignition source-allow time for oxygen concentration to decrease in room
- Do not allow an ignition source to enter the bowel when it is distended with gas
- Inspect all instruments for evidence of insulation failure





# Safe Use of Possible Ignition Source Devices

- If using electrosurgical units
  - Do not activate when near or in contact with other instruments
  - Use a return electrode monitoring system
  - Only the person controlling the active electrode activates the ESU
  
- Tips of cautery instruments should be kept clean and free of char & tissue
  
- When not in use, place ignition sources in a designated area away from the patient.



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# Controlling Fuel Sources

- Use moist towels around the surgical site when using a laser
- During throat surgery, use moist sponges as packing in the throat
- Use water-based ointment and not oil-based ointment in facial hair and other hair near the surgical site.



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# Controlling Fuel Sources

- Prevent pooling of skin prep solutions
- Remove prep-soaked linen and disposable prepping drapes
- Allow skin-prep agents to dry and fumes to dissipate before draping
- Allow chemicals to dry
- Conduct a skin prep “time out”





# Controlling Fuel Sources

- Be aware of other surgical suite item fuel sources
  - Products that trap oxygen
    - Drapes, towels, sponges & gauze
  - Products made of plastic
    - ET tubes, Laryngeal masks & suction caths
  - Patient related sources
    - Hair
    - GI gases



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# Handling a Surgical Fire

- Immediately stop the surgery
- Stop the flow of all airway gases
- Disconnect the breathing circuit
- Remove all burning & burned materials from patient
- Extinguish the fire
- Care for the patient





# Surgical Fire Prevention

- Conduct education and drills during orientation and at least annually
- Involve all OR and Surgical staff in surgical fire drills
- Evaluate each drill and identify opportunities for improvement
- Ensure surgical suites and areas have appropriate fire fighting equipment
- Ensure staff knows how to utilize the fire fighting equipment



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# Surgical Fire Prevention

- Promote a safety culture that allows all surgical team members to speak up
  - Without fear of punishment or retaliation
- Support reporting of near misses
- Ensure all fires, big or small, are reported
- Conduct debriefings after any near miss or surgical fire
- Secure any materials or devices involved in a surgical fire







# Resources

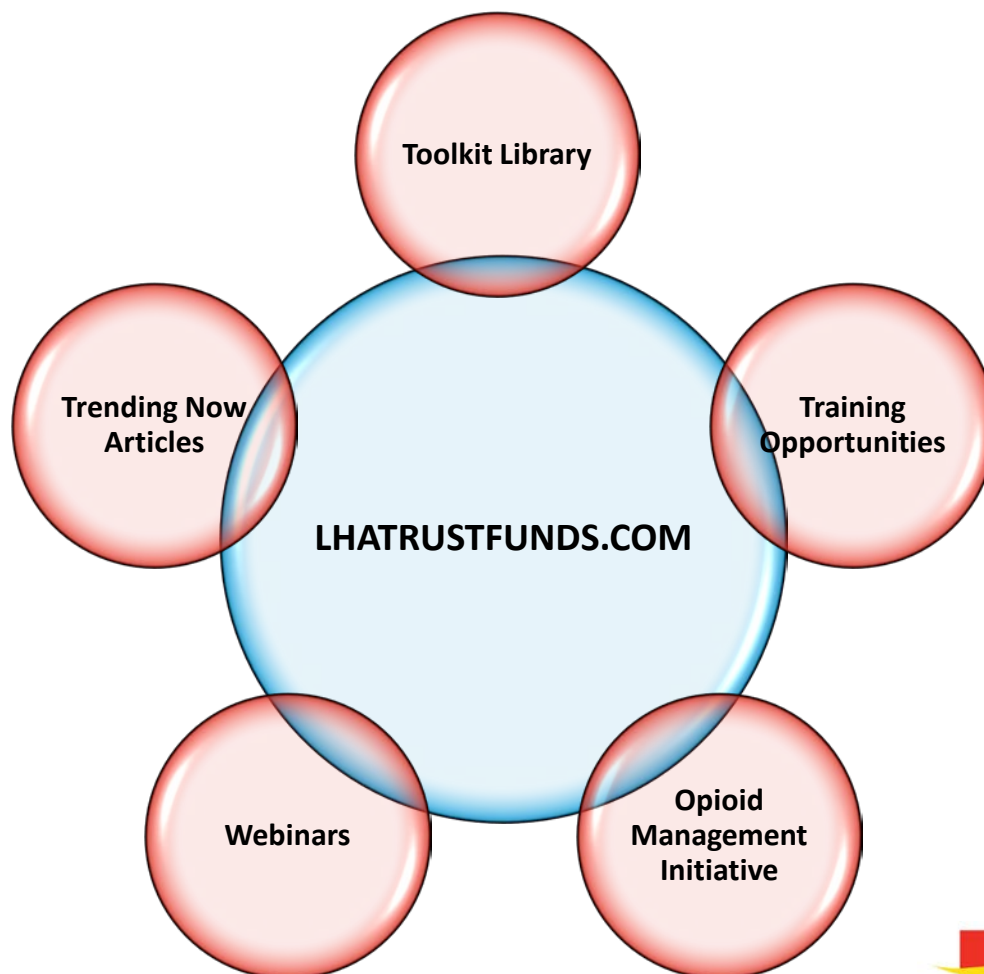
- AORN Fire Safety Toolkit, [www.aorn.org](http://www.aorn.org)
- Anesthesiology-Operating Room Fires March 2019  
<http://anesthesiology.pubs.asahq.org/article.aspx?articleid=2721200>
- Recommendations to Reduce Surgical Fires and Related Patient Injury: FDA Safety Communication, May 29, 2018  
<https://www.fda.gov/medicaldevices/safety/alertsandnotices/ucm608637.htm>
- Surgical Fires- ECRI Institute, June 1, 2016  
[https://www.ecri.org/components/HRC/Pages/SafSec13\\_1.aspx?tab=2](https://www.ecri.org/components/HRC/Pages/SafSec13_1.aspx?tab=2)



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# Questions

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