OR FIRE SAFETY

• This module covers the elements present in a fire, fire hazards, fire prevention, fire extinguishers, fire drills and procedures to follow (R.A.C.E.) in the event of a fire.

• Contents:
  – Overview
  – Fire Triangle
  – Building Design
  – Fire Prevention
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  – Fire Extinguishers and P.A.S.S.
  – Fire Drills
  – Summary
The Fire Triangle

- **There are three (3) elements in every fire:**
  - **Oxygen** (In sufficient quantities to support combustion)
    - Found in the air we breathe, as well as in medical gases used for patient treatment.
  - **Fuel** (A fuel or combustible material)
    - The source of ignition; for example, a spark, a cigarette, a heating element, or static electricity.
  - **Heat** (An ignition source)
    - Any material that contributes to the combustion of a fire. Examples include furniture, clothing, and linens, as well as flammable materials such as lighter fluid and rubbing alcohol.
- **If only one of these elements is removed from contact with the other two, the threat of fire can be minimized.** Thus, if oxygen, heat, or the fuel supply can be removed, there is minimal risk of fire.
The OR Environment

- In normal situations we are usually safe when the three elements are kept apart. In the operating room, however, factors come into play that increase the risk of these three elements coming into intimate contact:
- The O.R. environment contains combustible materials of all types, including gauze sponges, towels, drapes and plastic materials (such as various tubes, syringes and suction canisters)
- The use of high-energy heat or ignition sources is increasingly common, including lasers, fiberoptic light sources, ESUs and other electrical equipment (such as microscopes, endoscopes, monitors and hyperthermia units)
- There is an oxygen-enriched environment. Oxygen-enriched atmospheres exist routinely wherever inhalation anesthesia is used. In many instances of regional or local anesthesia, the patient receives supplemental oxygen to counteract the respiratory depressant effects of sedation. Nitrous oxide, which is frequently used as an adjunct to anesthesia, will support combustion just as readily as oxygen.
The OR Environment

• The O.R. team must be aware that all of these elements (fuel, ignition sources and oxygen) are present in an operating room every time there is a procedure and must take every precaution to ensure that they are kept apart.
The OR Environment

• During head and neck procedures particular attention must be given to prepping, draping and positioning the patient, as patients with their heads draped are more susceptible to fire because supplemental oxygen can accumulate under the drapes.

• To decrease the risk of fire, the prep solution must be given adequate time to dry (2-3 minutes) - especially if there is alcohol in the solution.

• Draping and positioning the patient should be performed in a manner that does not allow pooling of oxygen under the drapes. Every effort should be made to use no more oxygen than is necessary to maintain adequate oxygen levels. If possible, provide room air or less than or equal to 30% oxygen, depending on patient needs.

• Oxygen can also be combined with air to decrease the risk of fire. If facial hair is exposed, coat the hair with a water-soluble surgical lubricating jelly to make it nonflammable.

• Additionally, moisten sponges, gauze and pledgets (and their strings) to render them ignition resistant. This is also true for chest procedures, where oxygen may pool in the open body cavity.
The OR Environment

- During all procedures, as a proactive safety measure, sterile water or saline must be on the back table prior to ESU, argon beam coagulator (ABC) or lasers being used. Additional safety measures that should be taken when performing electrosurgery, electrocautery or laser surgery are as follows:
  - Stop supplemental O2 at least one minute before and during use of the unit, if possible. (Surgical team communication is essential.)
  - Activate the unit only when the active tip is in view, especially if looking through a microscope
  - Deactivate the unit before the tip leaves the surgical site
  - Place electrosurgical electrodes in a holster or another location off the patient when not in active use (i.e., when not needed within the next few moments)
  - Place lasers in standby mode when not in active use
  - Do not place rubber catheter sleeves over electrosurgical electrodes
General Precautions

- Fire and smoke walls separate buildings into smoke compartments. Each stairwell is a separate smoke compartment.
- OR Rooms are within smoke compartments.
- Area shutoff valves for oxygen lines are provided in patient areas. Anesthesia or Charge Nurse on the unit are authorized to shut off the oxygen supply valve.
- Valves should never be shut-off until it is verified that all users have been successfully converted to portable cylinders.
- Do not use elevators during an alarm situation

SMOKE COMPARTMENT - A space within a building that is enclosed by smoke barriers on all sides, including the top and bottom.
The Fire Alarm System

• The Fire Alarm System contains:
  – Pull stations
  – Smoke detectors
  – Duct detectors
  – Sprinklers
  – Flow switches
  – The system is continuously monitored

• Consider yourself to be in a fire situation each time the alarm sounds
General Guidelines

• Enforce "no smoking" rules.
• Use only approved extension cords.
• Keep flammable materials away from ignition sources.
• Enforce policies about unauthorized appliances and equipment.
• Keep general housekeeping in order.
• Report or correct any fire hazards.
Smoke Free/Tobacco Free Environmental Policy

• As of March 1, 2010, this policy is in place to provide a smoke-free and tobacco-free environment to employees, patients (inpatients and outpatients), volunteers, visitors, physicians, residents, students, emergency medical staff, contractors and others.

• In general, smoking and the use of tobacco products are not permitted on any JHS campus, garage, or within any JHS facilities. Smoking in personal vehicles is not permitted while on JHS property.
Extension Cords

- These are provided by Plant Operations.
- Cords must have a grounded plug.
- Use the correct cord for the load and protect the cord from traffic.
- Must be in good working condition.
- **Do not** overload electric sockets or circuits.
Flammable Materials

- Keep **flammable materials** away from **ignition sources**.
- Flammable Materials: Things that can ignite easily and burn rapidly.
- Ignition Sources: Anything that creates enough heat to ignite a fuel. Examples include a spark, a smoldering cigarette, a charged heating element, static electricity, etc.
- Combustible: Capable of igniting (causing fire). Combustible liquids have a flash point at or above 100 degrees Fahrenheit.
- Flammable: A solid, liquid, vapor, or gas (material) which ignites easily and burns rapidly. Flammable liquids have flash points below 100 degrees Fahrenheit.
Types of Fires

- **Class A** fires involve ordinary combustibles including wood, paper, cloth, rubber, and plastics.
- **Class B** fires involve flammable liquids such as oil, grease, and flammable gases.
- **Class C** fires involve energized or plugged-in sources. Sources include electrical equipment such as household appliances, surgical equipment, and computer equipment.
- **Class D** fires involve combustible metals including magnesium, potassium, and sodium.
Unauthorized Appliances and Equipment

- Enforce policies about unauthorized appliances and equipment. All electrical equipment for use within the facility must be inspected and approved by Maintenance or Biomed prior to being placed in service.
- Patients may not bring personal appliances into the facility.
- Appliances and equipment may cause **Class C** fires, which are electrical, energized, or "plugged-in."
- Use the correct equipment for the environment.
- Avoid sparks and flames in an oxygen-enriched environment.
General Housekeeping

• Practice good general housekeeping.
  – Empty trash cans frequently.
  – Do not allow piles of soiled rags and linens to accumulate.
  – Discard boxes and papers.
  – Keep exits and corridors clear.
Fire Hazards

• Report or correct any fire hazards. Report any fire hazards to the Safety Officer or on off hours, the Security Department.

• Do not use damaged electrical wires, plugs, receptacles, lights, or equipment.

• Strictly control chemical storage such as **solvents** (a liquid capable of dissolving other substances) and **flammable materials**.

• Promptly clean up all spills, especially in the presence of electrical equipment.

• Dispose of empty containers.
Fiberoptic Light Sources

- Fiberoptic light sources can start fires
- Complete all cable connections before activating the source
- Place the light source in standby mode, or turn the unit off when disconnecting cables
- Never leave a light cord that is still luminating on top of the patient drapes
- Although surgical drapes are fire retardant, they are still combustible
R.A.C.E.

• In the event of a fire, remember R.A.C.E.
  – Rescue
  – Alert / Alarm
  – Confine / Contain
  – Extinguish

• The fire plan (R.A.C.E.) must be carried out in order to ensure effectiveness
Rescue

• In operative or procedural areas the following steps should be taken in order:
  – Immediately smother/put out the fire (when safe to do so)
  – Remove the burning material from contacting the patient (drapes, ETT, etc.)
  – Have the anesthesiologist stop the flow of gases (i.e., O2, N2O, Desflurane, etc.)
  – Save any material/devices for follow-up investigation

• Rescue anyone who is in immediate danger (patients, visitors, staff, vendors, etc)

• Clear corridors of all unnecessary traffic and potential obstructions
Alert / Alarm

- Activate the fire alarm by pulling a fire alarm pull station closest to the fire area
  - Fire alarm pull stations are normally located near building exits, stairwells, and all nurses stations
- Alert personnel by yelling out **Code Red** and location of the fire
- Contact the Emergency Page Operators by dialing
  - JMH: 85-6123
  - JNMC: 5555
  - JSCH: 7777
**Confine / Contain**

- Separate people from smoke and fire
- Contain the fire by closing all doors and windows and any other openings that may allow smoke or fire to travel
- Check all rooms for smoke and fire
- Close the door when you exit the room to keep the smoke and fire contained to the room / area of origin
**Extinguish**

- Remember P.A.S.S. to use a fire extinguisher
  - **Pull**
  - **Aim**
  - **Squeeze**
  - **Sweep**

- Know the location and type of fire extinguishers in your area. All extinguishers are rated for their designated location.
- The fire extinguishers throughout the OR areas are CO2 extinguishers.
- Always keep yourself between the fire and your way out of the area.
- Try to extinguish only small fires in their initial stages (incipient stage).
- **Never** throw water on electrical fires (Class C) or flammable liquids (Class B).
- Always obtain at least two (2) fire extinguishers and take them to the scene of the fire.
Using a Portable Fire Extinguisher

Remember the **P.A.S.S. method** for Fighting a Small Fire

- **P**ull the round pin

- **A**im the nozzle at base of the fire while standing 6 to 8 feet away

- **S**queeze handles together

- **S**weep slowly from side to side
Extinguish

• **Never** throw water on electrical fires (Class C) or flammable liquids (Class B).

• After a fire extinguisher is used, remove it from service and request a work order to have it replaced/ recharged.
Fire (Life) Safety Equipment

- Fire Alarm Pull-Stations
  - Know locations of all alarm pull stations within unit/department
- Smoke Detectors
  - Should never be covered or tampered with
- Fire Exits
  - Know all horizontal and vertical evacuation routes from unit
- Smoke/Fire Rated Doors
  - Separation of Smoke Compartments
- Fire Sprinklers
  - Nothing can be stored within 18” from the bottom of any fire sprinkler
  - Fire Sprinkler should be free of dust
  - No items should be hung from or near fire sprinklers
Fire (Life) Safety Equipment

• Visual (Flashing Lights) & Audible Fire Alarms
  – These visual and audible indicators notify patients, visitors, and staff members that a fire emergency is occurring somewhere in the building where the alarm is sounding
  – The emergency situation is active until both visual and audible notifications have stopped

• Fire Extinguishers
  A = (Water) Combustibles-paper, wood, trash
  B = (CO2) Flammable liquids, oils, chemicals
  C = (Halon) Electrical motors, pumps, wires
Evacuation

• **Horizontal Evacuation:** Movement of individuals along the same level to an area of safety beyond a smoke/fire door
  – This movement can be within the floor of origin or to an adjoining building on the same level
  – Staff members may implement this mode of evacuation when deemed necessary
  – Fire Doors are indicated throughout JHS by a label similar to the following:

• **Vertical Evacuation:** Movement of individuals to an area of safety either above or below the floor of origin
  – This movement may be within the same building or to a floor above or below in another building
  – In a business occupancy building, this movement is immediate
  – In a healthcare occupancy building, this movement is to occur only with the order and direction of the Fire Department charge officer or a JHS Incident Commander
Summary

• Know what the fire triangle represents: oxygen, heat, and fuel
• Be aware of how building design can help you during a fire
• Use recommended fire prevention measures for smoking, extension cords, flammable materials, appliances and equipment, general housekeeping, and fire hazards
• Remember what to do in the event of a fire:
  – R.A.C.E.
  – P.A.S.S.
For More Information

• Refer to JHS Administrative Policy #112 and the Perioperative Services Specific Fire Plan

• You may also contact the JHS Environmental Health & Safety Department at 305-585-2903 or by email at JHS-Environmental-HealthSafety-Dept@jhsmiami.org
Videos

• Evacuation of Healthcare Facilities (NFPA)
  – To view an optional video produced by the National Fire Protection Association, click the link below:
  – Running Time = Approximately 13 minutes
  – Scenario is a real-life fire emergency in a hospital setting

• How to use a Fire Extinguisher
  – To view this video, click on the link below:
  – Running Time = Approximately 2 minutes
References
