Fire prevention: Avoid oxygen to face

New recommendations for preventing surgical fires seek to change a long-standing practice—open delivery of 100% oxygen to the face during head, face, neck, or upper-chest surgery.

The new advice from the Anesthesia Patient Safety Foundation (APSF) and ECRI Institute includes:

- Use only air for open delivery on the face for spontaneously breathing sedated patients who can maintain safe blood oxygen saturation without supplemental oxygen.
- If the patient does need extra oxygen, secure the airway with a laryngeal mask airway or tracheal tube.
  Securing the airway prevents oxygen-enriched gases from accumulating under the surgical drapes. Oxygen-enriched atmospheres contribute to the majority of reported surgical fires, the recommendations note.

There are limited exceptions for open oxygen delivery, such as carotid artery surgery, neurosurgery, and some pacemaker implantations where patients need to be able to speak during the procedure.

“These are significant recommendations that are intended to change clinical practice that has been in effect for 30 or more years,” says Mark Bruley, ECRI Institute’s vice president of accident and forensic investigation, a national expert on surgical fires who is on the committee that developed the recommendations.

For surgery in locations not near an oxygen source, such as the abdomen, groin, legs, and hands, open delivery of oxygen can be used, but the risk of fire is always present, the recommendations note.

The new advice expands on a 2008 practice advisory on OR fires from the American Society of Anesthesiologists.

A fire prevention time-out

Preventing surgical fires is a team effort. A good way to assess the fire risk for each case is to do a fire-prevention time-out right before the procedure, Bruley advises.

“A surgical fire prevention time-out shouldn’t take more than a few seconds,” he says. “If there are risks, you can consider the appropriate means of prevention.”

Christiana Care, a health system based in Newark, Delaware, has included a fire risk assessment with the Universal Protocol for surgical site verification for more than 4 years (sidebar, p 21). The assessment scores fire risk from 1 (low risk) to 3 (high risk), with 1 point each for:

- procedure site or incision above the xiphoid
- open oxygen source (face mask/ nasal cannula)
- ignition source (cautery, laser, fiberoptic light source).

A score of 3 means a high-risk fire protocol is initiated.
“The fire assessment just takes seconds—our staff is very used to doing it,” says Judy Townsley, RN, CPAN, director of clinical operations/perioperative services.

“Because the fire-risk assessment is embedded in our process, this is really a confirmation,” adds Mary Cay Curran, RN, MSN, CAPA, perioperative manager for clinical standards. OR teams generally know which procedures are high risk and plan ahead. The fire risk assessment is documented as part of the electronic record.

**Surgical fire education**

New and updated resources for fire safety education reflect the new recommendations. ✷

**Anesthesia Patient Safety Foundation**

- Fire prevention recommendations
- Coming in spring 2010: Online course with continuing medical education credits.

—www.apsf.org

**ECRI Institute**

- Free posters for download:
  — Only You Can Prevent Surgical Fires.

—www.ecri.org/surgical_fires

Christiana Care’s fire safety tools are available at www.christianacare.org/homepage.cfm

**References**


ONLY YOU CAN PREVENT SURGICAL FIRES
Surgical Team Communication Is Essential

The applicability of these recommendations must be considered individually for each patient.

At the Start of Each Surgery:
- Enriched O₃ and N₂O atmospheres can vastly increase flammability of drapes, plastics, and hair. Be aware of possible O₃ enrichment under the drapes near the surgical site and in the fenestration, especially during head/face/neck/upper-chest surgery.
- Do not apply drapes until all flammable preps have fully dried; soak up spilled or pooled agent.
- Fibreoptic light sources can start fires: Complete all cable connections before activating the source. Place the source in standby mode when disconnecting cables.
- Moisten sponges to make them ignition resistant in oropharyngeal and pulmonary surgery.

During Head, Face, Neck, and Upper-Chest Surgery:
- Use only air for open delivery to the face if the patient can maintain a safe blood O₂ saturation without supplemental O₂.
- If the patient cannot maintain a safe blood O₂ saturation without extra O₂, secure the airway with a laryngeal mask, airway or tracheal tube.

Exceptions: Where patient verbal responses may be required during surgery (e.g., cardiac surgery, neurosurgery, pacemaker insertion) and where open O₂ delivery is required to keep the patient safe:
- At all times, deliver the minimum O₂ concentration necessary for adequate oxygenation.
- Begin with a 30% delivered O₂ concentration and increase as necessary.
- For unavoidable open O₂ delivery above 30%, deliver 5 to 10 L/min of air under drapes to wash out excess O₂.
- Stop supplemental O₂ at least one minute before and during use of electrosurgery, electrocautery, or laser; if possible. Surgical team communication is essential for this recommendation.
- Use an adherent incision drape, if possible, to help isolate the incision from possible O₃-enriched atmospheres beneath the drapes.
- Keep fenestration tissued edges as far from the incision as possible.
- Arrange drapes to minimize O₂ buildup underneath.
- Cool head hair and facial hair (e.g., eyebrows, beard, moustache) within the fenestration with water-soluble surgical lubricating jelly to make it nonflammable.
- For coagulation, use bipolar electrosurgery, not monopolar electrosurgery.

During Oropharyngeal Surgery (e.g., tonsillectomy):
- Scavenge deep within the oropharynx with a metal suction cannula to catch leaking O₂ and N₂O.
- Moisten gauze or sponges and keep them moist, including those used with uncuffed tracheal tubes.

During Tracheostomy:
- Do not use electrosurgery to cut into the trachea.

During Bronchoscopic Surgery:
- If the patient requires supplemental O₂, keep the delivered O₂ below 30%. Use inhalation/exhalation gas monitoring (e.g., with an O₂ analyzer) to confirm the proper concentration.

When Using Electrosurgery, Electrocautery, or Laser:
- The surgeon should be made aware of open O₂ use. Surgical team discussion about preventive measures before use of electrosurgery, electrocautery, and laser is indicated.
- Activate the unit only when the active tip is in view (especially if looking through a microscope or endoscope).
- Deactivate the unit before the tip leaves the surgical site.
- Place electrosurgical electrodes in a hanger 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.

ECRI Institute
The Discipline of Science. The Integrity of Independence.
### Component #1 Verification Process

<table>
<thead>
<tr>
<th>Sending Unit</th>
<th>Prep &amp; Holding</th>
<th>Unit Doing Procedure</th>
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- **Mark all that apply**
- \*\* indicates required field
- Name and date of birth confirmed
- Patient/Decision maker verbalizes planned procedure
- Schedule confirms planned procedure
- Consent confirms planned procedure
- History and Physical confirms planned procedure
- Diagnostic Study confirms planned procedure
- Progress Record/Consult confirms planned procedure
- Site marking required (go to Component 2)
- Site marking not required

### Component #3 Time Out

The entire procedure team has performed a Time Out and all members have verbally agreed.

- Time out included the verification of: 1st \* 2nd \* 3rd
- Correct patient identity
- Agreement on procedure to be done
- Correct site and side
- Diagnostic study confirmation of site and side
- Availability of implants
- Availability of special equipment

<table>
<thead>
<tr>
<th>1st Time Out</th>
<th>Time:</th>
<th>Initial:</th>
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<tr>
<td>2nd Time Out</td>
<td>Time:</td>
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<td>3rd Time Out</td>
<td>Time:</td>
<td>Initial:</td>
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### Component #2 Site Marking (if required)

After verification has been completed, the patient, if able, will write "Yes" with a permanent marker on or near the site as possible:
- \( \text{RIGHT} \) \( \text{LEFT} \)

- **Site marked by:**
  - \( \text{Patient} \)
  - \( \text{Family member (Relationship):} \)
  - \( \text{Healthcare Provider} \)

<table>
<thead>
<tr>
<th>Initials</th>
<th>Signature/Title</th>
<th>Print Name</th>
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### Fire Risk Assessment

- Procedure site or incision above the xiphoid
- Open oxygen source (face mask/ nasal cannula)
- Ignition source (cautery, laser, fiberoptic light source)

<table>
<thead>
<tr>
<th>SCORE 1 or 2:</th>
<th>Total Score</th>
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<table>
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<th>SCORE 3:</th>
<th>Total Score</th>
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- **Initial:**
Fire risk assessment

Routine protocol

1. Fuel
A. When an alcohol-based solution is used, use minimal amount of solution and allow sufficient time for fumes to dissipate before draping. Observe drying time (minimum 3 minutes). Do not drape patient until flammable prep is fully dry.
B. Do not allow pooling of any prep solution (including under the patient).
C. Remove bowls of volatile solution from sterile field as soon as possible after use.
D. Utilize standard draping procedure.

2. Ignition source
A. Protect all heat sources when not in use (cautery pencil holder, laser in stand-by mode, etc).
B. Activate heat source only when active tip is in line of sight.
C. Deactivate heat sources before tip leaves surgical site.
D. Check all electrical equipment before use.

High-risk protocol (includes all of the routine protocol)

A. Use appropriate draping techniques to minimize oxygen concentration (i.e., tenting, incise drape).
B. Electrical surgical unit (ESU) setting should be minimized.
C. Encourage use of wet sponges.
D. Basin of sterile saline and bulb syringe available for suppression purposes only.
E. Anesthesia care provider considerations:
   • A syringe full of saline will be available in reach of anesthesia provider for procedures within the oral cavity.
   • Documentation of oxygen concentration/flows. Use of “MAC circuit” oxygen administration.

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