Université de Montréal

Centre intégré universitaire de santé et de services sociaux du Centre-Sud-de-l'Île-de-Montréal
Québec

# Complications - Sécurité

CSB – anesthésiologie et complications

Avril 2025

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Anesthésiologiste CIUSSS centre Sud de l'île de Montréal

Président Comité D'Intérêt en Santé Mondiale

Responsable comité mieux-être

CASIEF | Canadian Anesthesiologists' Society International Education Foundation

### Contenu de l'examen écrit

Le contenu de l'examen est élaboré en fonction d'un plan directeur qui reflète les Compétences en anesthésiologie. Le contenu est équilibré afin d'assurer une représentation appropriée des domaines pertinents. Le tableau ci-dessous présente les domaines de connaissances habituellement évalués et la plage de points en pourcentage qui leur est accordée dans l'examen.

| Catégorie | Points (en %)* QCM |
|---|---|
| 1. Évaluation et prise en charge des voies respiratoires | 0-5 |
| 2. Cardiologie et anesthésie cardiovasculaire | 5-10 |
| 3. Complications, sécurité des patients, éthique et statistique | 5-10 |
| 4. Soins intensifs et réanimation | 5-10 |
| 5. Monitorage et équipement | 5-10 |
| 6. Neurologie et anesthésiologie neurochirurgicale | 0-5 |
| 7. Anesthésie obstétricale | 5-10 |
| 8. Orthopédie et anesthésie pour un trauma | 0-5 |
| 9. Anesthésie pédiatrique | 5-10 |
| 10. Médecine périopératoire et surspécialités médicales (p. ex. endocrinologie, hématologie, médecine gériatrique, immunologie clinique et allergie, maladies infectieuses, rhumatologie, thermorégulation, gastroentérologie, etc.) | 10-15 |
| 11. Pharmacologie | 5-10 |
| 12. Anesthésie régionale et prise en charge de la douleur | 5-10 |
| 13. Pneumologie et anesthésie thoracique | 5-10 |
| 14. Surspécialités en chirurgie et anesthésie (p. ex. ambulatoire, anesthésie dans les lieux éloignés, gastro-intestinale, génito-urinaire, laparoscopie, ophtalmologie, oto-rhino-laryngologie et chirurgie cervico-faciale, chirurgie plastique, transplantation) | 10-15 |

*Les plages sont approximatives et peuvent varier légèrement.

Kim *et al. BMC Anesthesiology* (2018) 18:193
https://doi.org/10.1186/s12871-018-0661-y

BMC Anesthesiology

RESEARCH ARTICLE Open Access

# Evaluation of anesthesiologists' knowledge about occupational health: Pilot study

Daniel Dongiu Kim*, Aldemar Kimura Jr, Dayanne Karla Lopes Pontes, Maycon Luiz Silva Oliveira and Debora Oliveira Cumino

# Conclusion?

- Manque connaissance flagrant en prévention d'accident professionnel
- 75% ne savaient pas comment agir lors d'un feu pendant chx
- 56% ont échoué à identifier salle de réveil comme endroit où contamination par agents inhalés est maximal
- 43% ont échoué à énuméré équipement protection personnel
- Manque d'observance de mesures préventives (30% lavage des mains systématiques avant chaque patient, 52% pas de gants pour IV, 11% n'utilisent pas protection contre radiation)

# RISQUE PROFESSIONNEL (occupational hazard)

Maladie professionnelle: Altération de la santé qui est causée par une activité professionnelle.

ROYAL COLLEGE
OF PHYSICIANS AND SURGEONS OF CANADA
COLLÈGE ROYAL
DES MÉDECINS ET CHIRURGIENS DU CANADA

# Anesthesiology Competencies

**2017**

**EDITORIAL REVISION – JUNE 2021**
**VERSION 1.0**

*Effective for residents who enter training on or after July 1st 2017.*

**I) Identification of Occupational Hazards for Anesthesiologists and other OR personnel**

| | | |
|---|---|---|
| 5.12 | Demonstrate an understanding of the potential risks to themselves and others when dealing with high risk patients in various situations in the operating room and potential prevention strategies, including but not limited to: | |
| | 5.12.1 | Needle stick |
| | 5.12.2 | Infections – needle, airborne, contact |
| | 5.12.3 | Toxic substance in the environment (e.g., volatile agents) |
| | 5.12.4 | Laser |
| | 5.12.5 | Fire safety |
| | 5.12.6 | Violent patient – Assault (physical, verbal) |
| 5.13 | Demonstrate an understanding of the potential risks encounter during practice and potential prevention strategies, including but not limited to: | |
| | 5.13.1 | Physical injury related to patient lifting |
| | 5.13.2 | Noise pollution |
| | 5.13.3 | *Post Traumatic Stress Disorder (PTSD) after adverse events* |
| | 5.13.4 | Fatigue |
| | 5.13.5 | Substance abuse |
| | 5.13.6 | Suicide and other mental illness |

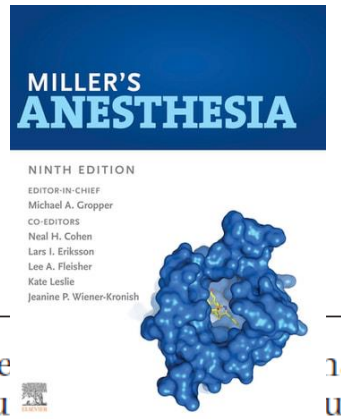
# Cas clinique

- Homme, 68 ans, fumeur, MPOC
- Chirurgie ORL – laser au niveau cordes vocales
- Chirurgien vous dit ‘’petite affaire’’ – 5 minutes;
- Fi02 50%
- Chirurgien fait laser sans vous avertir


O.R. FIRES DON'T NEED
FLAMMABLE ANESTHETICS

## Practice Advisory for the Prevention and Management of Operating Room Fires

*An Updated Report by the American Society of Anesthesiologists Task Force on Operating Room Fires*




**Airway Fires**

An airway fire is a potentially de… …nat
may occur during tracheotomy su… …ur-

APSF NEWSLETTER October 2020 PAGE 82

**Surgical Fire Prevention: A Review**

*by Charles Cowles MD, Chester Lake MD, and Jan Ehrenwerth, MD*


## 5 Electrical and Fire Safety*

**JAN EHRENWERTH**

ANESTHESIOLOGY

**Operating Room Fires**

Teresa S. Jones, M.D., Ian H. Black, M.D.,
Thomas N. Robinson, M.D., Edward L. Jones, M.D.

*(ANESTHESIOLOGY 2019; 130:492–501)*

# Guide

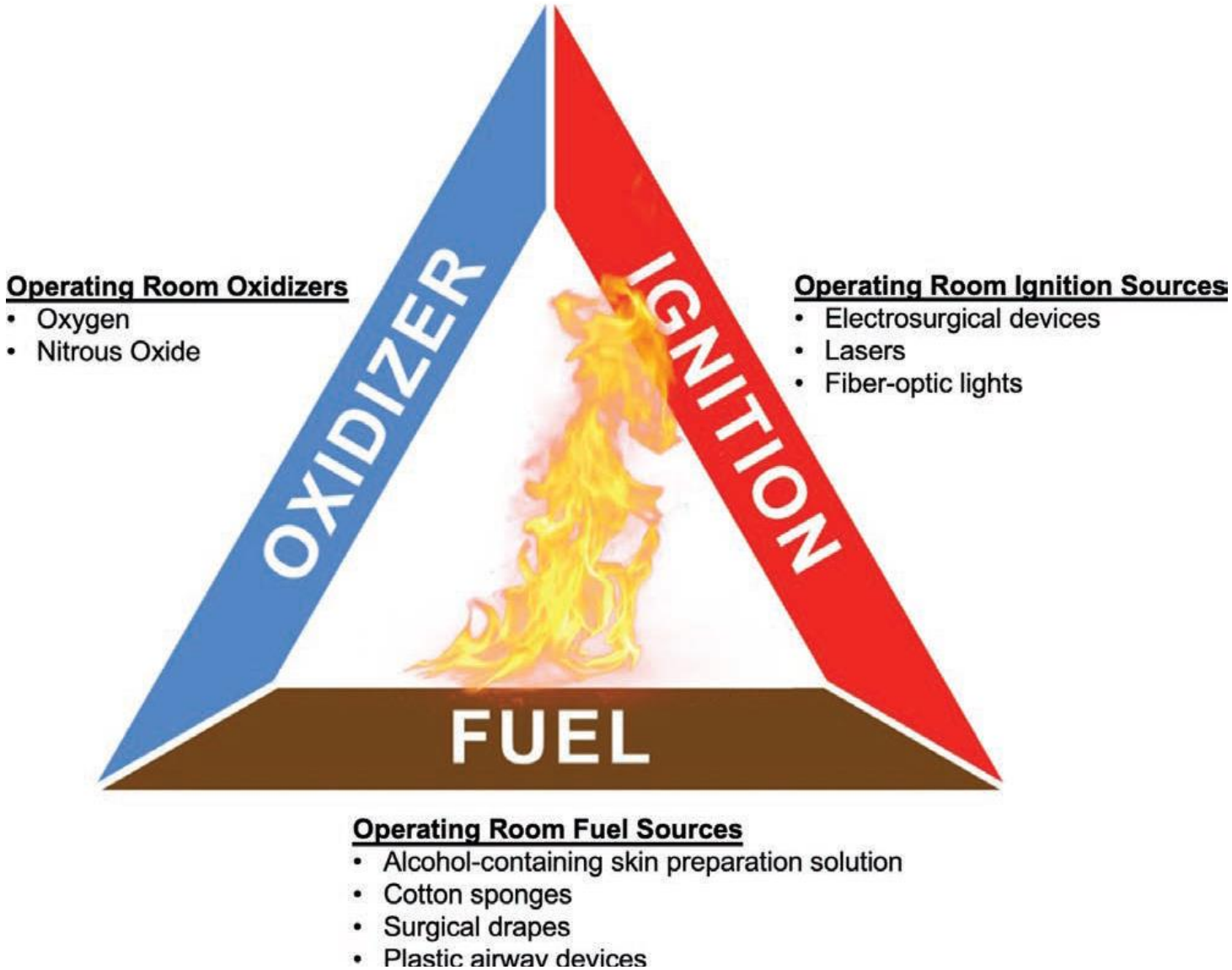
- Les guides sont des ‘’practice advisories’’ et non des guidelines ou standards de pratique.
- Consensus d’expert, selon la littérature


# Feu en SOP

- 650 événements/année
- 2-3 morts/année
- 85% survient tête, cou, thorax haut
- 1ere cause : Bovie (monopolaire), 2eme: laser

# 3 composantes

- Comburant
- Carburant
- Ignition



# Don't Fuel the Fire

***HUNDREDS OF FIRES occur in U.S. operating rooms each year,*** caused by activating ignition sources in alcohol vapor- or oxygen-enriched environments.

1. ***Ask*** **if flammable materials, oxidizers and potential fire ignition sources will be used for the procedure.**
2. ***Learn*** **how to safely use these items together.**
3. ***Know*** **what actions to take if a fire does occur.**

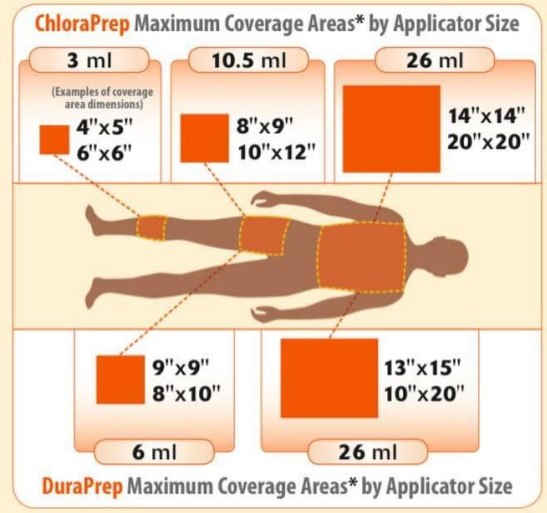
***The 'fire triangle' shows the three elements needed to start a fire (oxygen + fuel + ignition source)*** and who is responsible for managing them.

- **Learn to recognize early signs of fire.**
- **Have $CO_2$ fire extinguishers and saline or water solution available.**
- **Participate in OR team fire drills.**


## Wait for Preps to Evaporate and $O_2$ to Dissipate

***Properly apply alcohol-based prepping solutions and let them dry.*** ChloraPrep® and DuraPrep® are both nearly 75% isopropyl alcohol which is highly flammable. **Wait at least three minutes** for alcohol to ***evaporate*** from hairless skin and **up to one hour** from hair before using ignition devices. Apply drapes only after preps have ***dried.*** Don't use too big an applicator for too small an area *(see diagram)*. **Don't let alcohol pool** in skin creases. Remove alcohol-soaked materials.

***Wait for oxygen to dissipate*** from under drapes, ***and flush*** with room air ***or scavenge*** away before using ignition devices. Use as **diluted** a concentration of oxygen as possible. Stop supplemental oxygen **at least one minute** before using igniton devices. Inform the surgeon before increasing oxygen concentration.




*** Coverage areas are approximate — *don't use too much.***


apsf www.apsf.org

Produced by the Center for Research & Innovation in Systems Safety CRISS

# Sources en SOP

**Table 1.** Fuel Sources in the Operating Room Fires

| | |
|---|---|
| Patient-dependent | |
| | Hair |
| | Tissue |
| | Gastrointestinal content (methane, hydrogen) |
| Patient-independent | |
| Solutions | Alcohol-based sterile skin preparations |
| | Wound closure (benzoin, mastazol) |
| | Degreasers (acetone, ether) |
| | Petrolatum-based dressings/ointments |
| | Paraffin, wax |
| Materials | Drapes (paper, cloth, plastic) |
| | Protective equipment (gowns, gloves, caps, and others) |
| | Dressings (gauze, bandages, tape) |
| | Gauze, sponges |
| | Airway devices (endotracheal tubes) |
| Equipment | Anesthesia (endotracheal tubes, masks, tubing, and others) |
| | Surgical (fiberoptic cables/wires, cuffs, tubing, drains, endoscopes, and others) |

Common fuels in the operating room. Of note, nearly all materials, even those marked "nonflammable," become flammable when the oxygen content is elevated.

# Safety Risk Assessment (Fire)

**PRESENCE OF ALL 3 = HIGH RISK**

- **Procedure involving head, neck, chest (front or back), or upper arm**
- **Open airway**
- **Use of ignition source**

No → **STANDARD RISK**

Proceed but frequently reassess for changes in fire risk

- **Avoid pooling of alcohol-based skin prep solutions**
- **Allow adequate drying time**
- **Surgeon communicates to the room prior to initial use of ignition source**

yes

Does the patient require oxygen?

No → Use room air sedation

yes

Does the patient require an FiO2 > 30% to maintain O2 saturation?

No → Administer O2 below 30% via the breathing circuit of the anesthesia machine

| Desired FiO2 | Oxygen flow for 5 L/min total | Air flow for 5 L/min total |
|---|---|---|
| 21% | 0.0 | 5.0 |
| 25% | 0.3 | 4.7 |
| 30% | 0.6 | 4.4 |

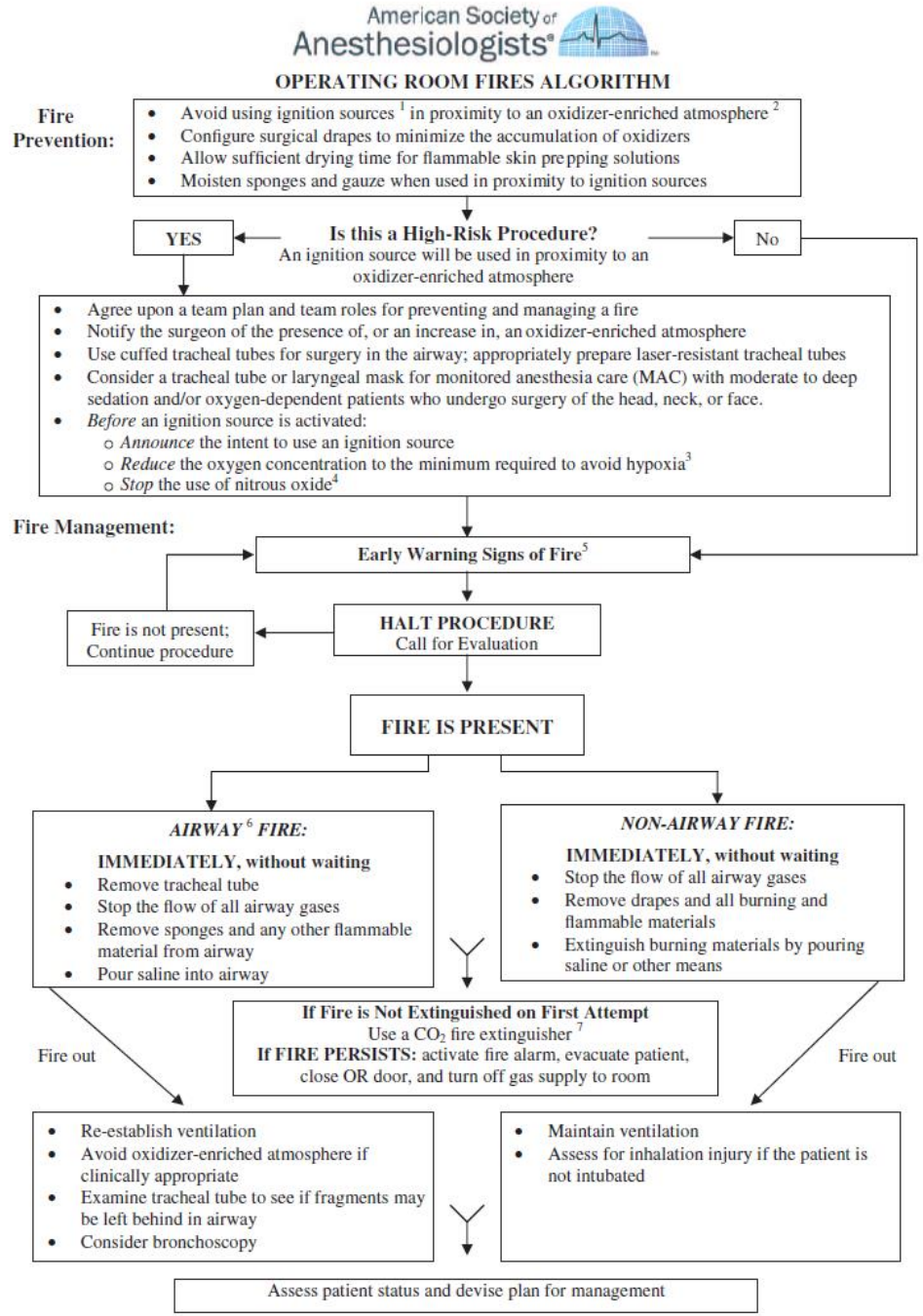
yes

**HIGH RISK**

- **GENERAL ANESTHESIA WITH ENDOTRACHEAL TUBE, LMA, OR OTHER SUPRAGLOTTIC AIRWAY DEVICE**
- If is an airway device is undesirable or not feasible, mitigate oxygen accumulation by sealing surgical field, uncovering the face and insufflating "blow by" air at 10 L/min. Have water available on the field and anesthesia workstation.

# Practice Advisory for the Prevention and Management of Operating Room Fires

*An Updated Report by the American Society of Anesthesiologists Task Force on Operating Room Fires*



# OPERATING ROOM FIRES ALGORITHM

**Fire Prevention:**

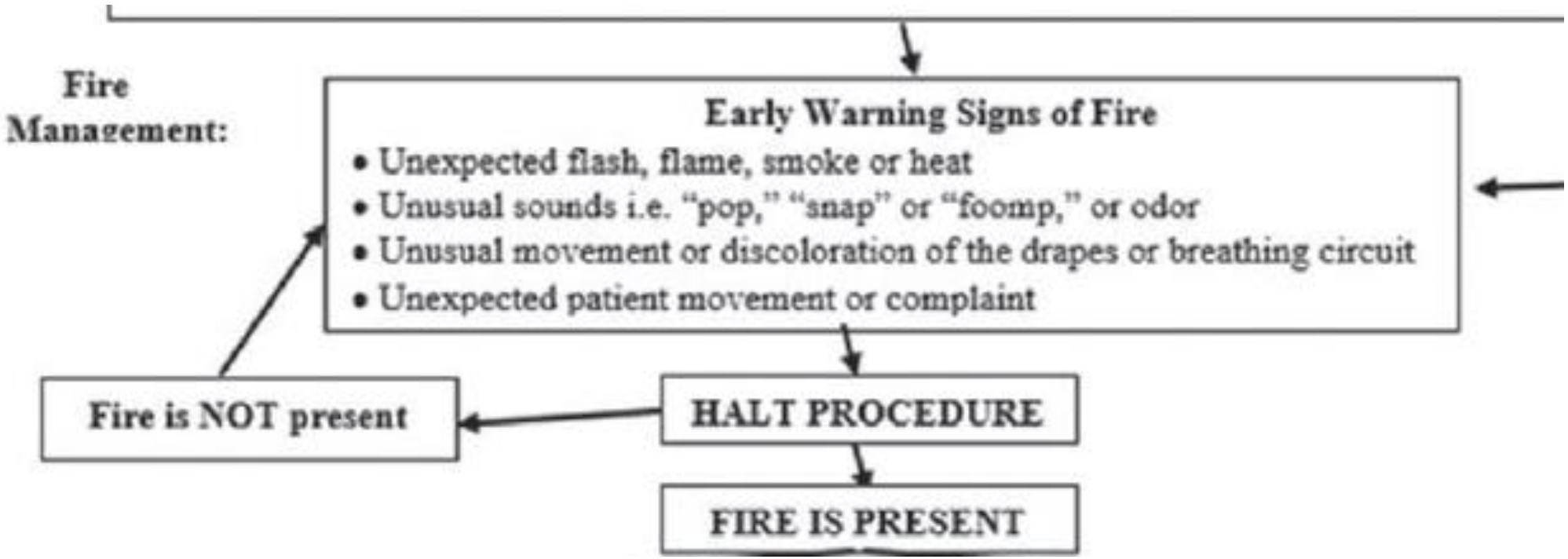
- Avoid using ignition sources [1] in proximity to an oxidizer-enriched atmosphere [2]
- Configure surgical drapes to minimize the accumulation of oxidizers
- Allow sufficient drying time for flammable skin prepping solutions
- Moisten sponges and gauze when used in proximity to ignition sources

**Is this a High-Risk Procedure?**
An ignition source will be used in proximity to an oxidizer-enriched atmosphere

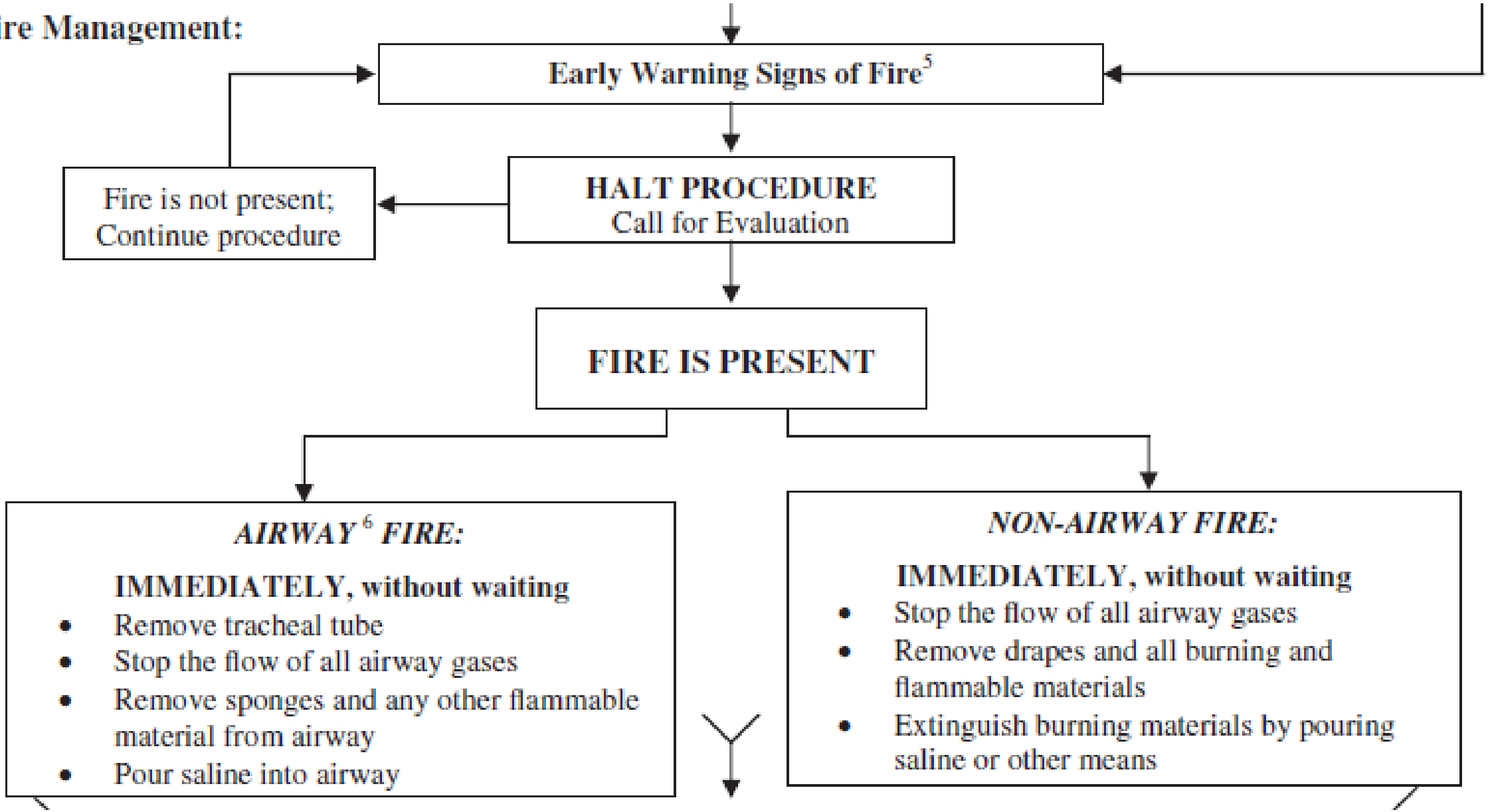
**YES**

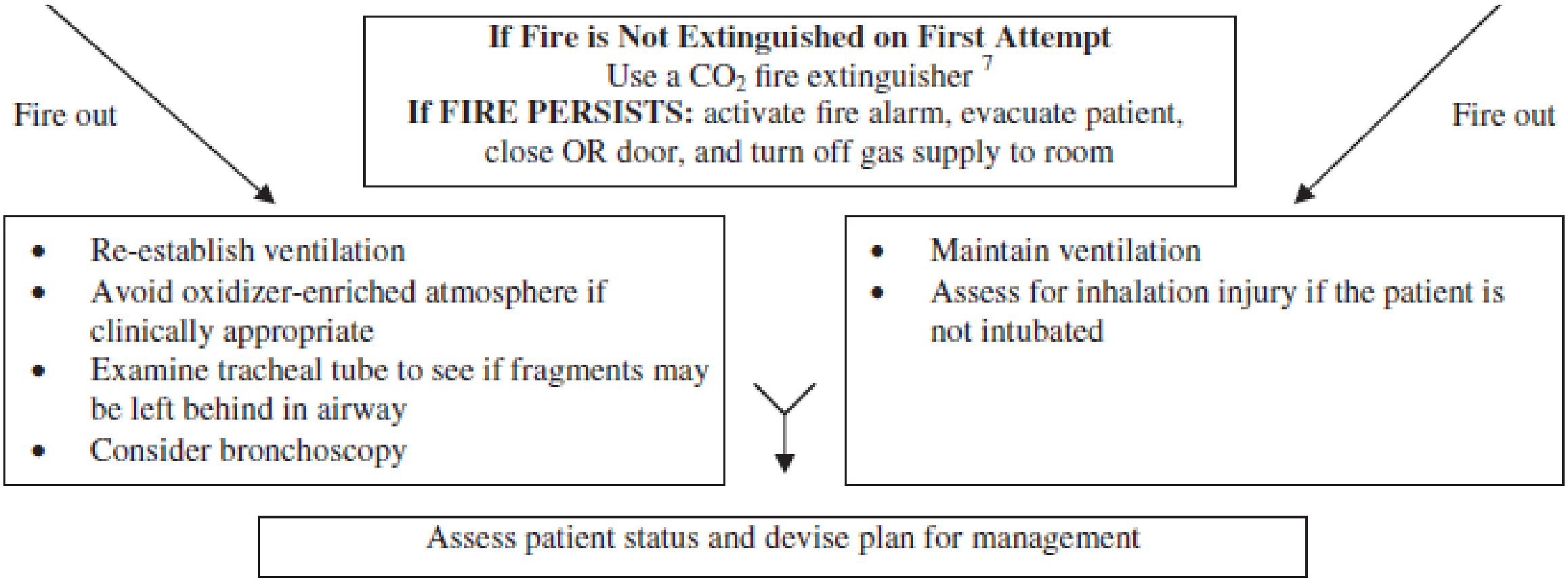
- Agree upon a team plan and team roles for preventing and managing a fire
- Notify the surgeon of the presence of, or an increase in, an oxidizer-enriched atmosphere
- Use cuffed tracheal tubes for surgery in the airway; appropriately prepare laser-resistant tracheal tubes
- Consider a tracheal tube or laryngeal mask for monitored anesthesia care (MAC) with moderate to deep sedation and/or oxygen-dependent patients who undergo surgery of the head, neck, or face.
- *Before* an ignition source is activated:
  - *Announce* the intent to use an ignition source
  - *Reduce* the oxygen concentration to the minimum required to avoid hypoxia[3]
  - *Stop* the use of nitrous oxide[4]

**No**


Fire Management:
Early Warning Signs of Fire
• Unexpected flash, flame, smoke or heat
• Unusual sounds i.e. "pop," "snap" or "foomp," or odor
• Unusual movement or discoloration of the drapes or breathing circuit
• Unexpected patient movement or complaint
Fire is NOT present
HALT PROCEDURE
FIRE IS PRESENT

## Fire Management:




If Fire is Not Extinguished on First Attempt
Use a $CO_2$ fire extinguisher [7]
If FIRE PERSISTS: activate fire alarm, evacuate patient, close OR door, and turn off gas supply to room
Fire out
Fire out
• Re-establish ventilation
• Avoid oxidizer-enriched atmosphere if clinically appropriate
• Examine tracheal tube to see if fragments may be left behind in airway
• Consider bronchoscopy
• Maintain ventilation
• Assess for inhalation injury if the patient is not intubated
Assess patient status and devise plan for management

## BOX 70.2 Management of Airway Fires

**Prevention and Preparedness**

1. Keep the $O_2$ concentration at approximately 30%, or less if possible. Use an $O_2$/air mixture. Avoid $N_2O$.
2. Use a "laser-safe" endotracheal tube.
3. Inflate the endotracheal tube cuff with dyed normal saline to provide an early indicator of cuff rupture.
4. Use a pre-prepared 50-mL syringe of saline to extinguish any fire, and flood the surgical field if a fire occurs.
5. Have an extra endotracheal tube available for reintubation in case a fire occurs.
6. Inform the surgical team working on the airway of any situation in which high concentrations of $O_2$ are being used.

**In the Case of an Airway Fire**

1. Stop lasering. Stop ventilation. Turn $O_2$ off (as well as $N_2O$ if it was mistakenly in use).
2. Inform the surgical team, and assign someone to call the control desk for help.
3. Remove the burning endotracheal tube* and drop it in the bucket of water, if available.
4. Put out the fire with your improvised fire extinguisher.
5. The area should be flushed with saline.

**When the Fire Is Extinguished**

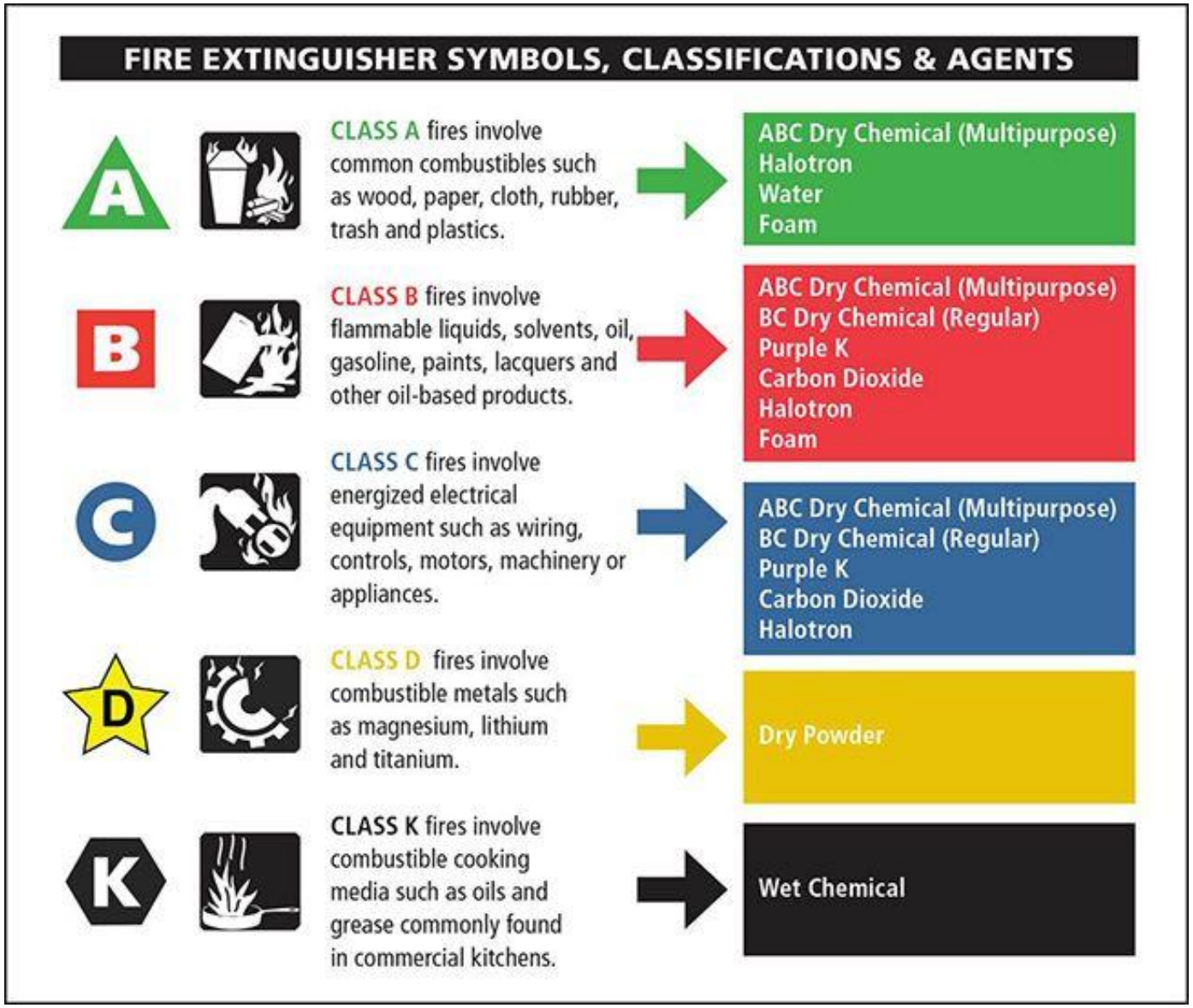
1. Ventilate the patient with 100% $O_2$ by facemask (or supraglottic airway if appropriate).
2. When the patient is stable, assess the extent of airway damage. Consider using a ventilating rigid bronchoscope; debris and foreign bodies should be removed.
3. Reintubate the patient if significant airway damage is found.
4. When appropriate, arrange for admission to an ICU.
5. Provide supportive therapy, including ventilation and antibiotics, and extubate when appropriate.
6. Tracheotomy may be needed.

*ICU*, Intensive care unit; *$N_2O$*, nitrous oxide; *$O_2$*, oxygen.
Courtesy Dr. B. Abdelmalak, Cleveland Clinic, Cleveland, Ohio.
*Removing the endotracheal tube may be inappropriate in some cases (see text).

# Recomendations:

- ASA – bleu méthylène avec salin pour voir perforation ballonnet lors chx à risque feu
- Association nurse anesthésiques: Gel isolant pour cheveux non clipé
- Compresses mouillées près airway
- Dilemme: préparation peau non-alcoolisé (chlorex et iodine vs CDC recommande préparation base alcool)
- Tube laser
- Préparation intestinale – non mannitol base prep (ce qui est fait mtn)

# À moins 75 pieds de chaque salle




Le guide de bonnes pratiques de l'ASA précise qu'un extincteur au dioxyde de carbone ($CO_2$) (type B-C) pour le bloc opératoire

**I) Identification of Occupational Hazards for Anesthesiologists and other OR personnel**

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- 5.13.4 Fatigue
- 5.13.5 Substance abuse
- 5.13.6 Suicide and other mental illness

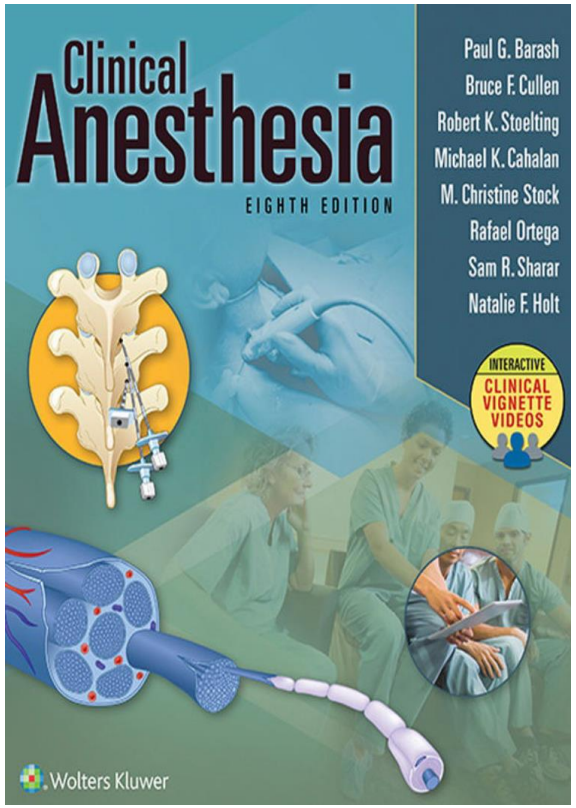
# Pas nouveau…



*Regular Review*

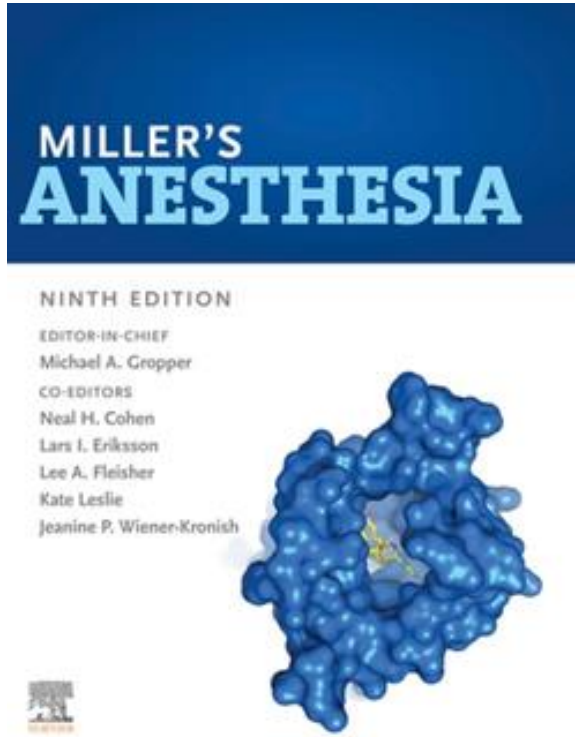
## Occupational hazards of anaesthesia

M P VESSEY, J F NUNN




# 3 Occupational Health

JONATHAN D. KATZ • ROBERT S. HOLZMAN • AMY E. VINSON




# 88 Occupational Safety, Infection Control, and Substance Abuse

CHRISTOPHER CHOUKALAS, MARILYN MICHELOW, and MICHAEL FITZSIMONS

| 5.12.1 | Needle stick |
| --- | --- |

- 2000: CDC rapportait 600 000 piqures accidentelles
- Needlestick Safety and Prevention Act
- Employeurs : disposition boîte déchet objets tranchants, vaccination hépatite B gratuit, avoir Clinique PEP et consultation médicale accessible pour employés en contact avec sang
- Aurait diminué environ 50%
- F.R = résident en anesthésie, quart de nuit, plus de 24hre
- Survient surtout lors preparation seringue et ‘’recapping’’
- Prévention: double gants, technique une main, suture courbe avec pince et porte aiguille

# Piqures accidentelles

- Cause #1 infection hépatine B/C HIV en anesthésie (recapping, suture, intradermique)
- PEP (prophylaxie post exposition): idéal 1hre, mais efficace ad 2 semaines)

**TABLE 88.5** Bloodborne Pathogens

| | Risk of Seroconversion After Percutaneous Exposure* | Progression to Chronic Disease |
|---|---|---|
| Hepatitis B | 6-30%** | 5% of immunocompetent adults |
| Hepatitis C | 0.5-2% | 75-85% |
| HIV | 0.3% | 100% |

| 5.12.2 | Infections – needle, airborne, contact |
|---|---|

- Précautions: ‘’standard’’ – aérienne – gouttelettes – contact
- Standard (universel): hygiène main avant après chaque contact patient
- Si contaminant visible: eau + savon
- Équipement Protection Indivuelle (PPE): blouse, gants, masque, protection oculaire (si contact avec sang/liquide) – donc INTUBATION!
- Transport patient – patient doit être protégé

# Contact

- Peau à peau
- RSV, SARM, C Diff
- Gants, jaquette

# Goutelettes

VOIES RESPIRATOIRES JUSQU'À UNE MUQUEUSE

PLUS GRAND 5UM

JAQUETTE, GANTS, MASQUE

INFLUENZA, STREP A

# PRÉCAUTIONS
# GOUTTELETTES/CONTACT
# + PROTECTION OCULAIRE

**Visiteurs** — Se présenter au poste des infirmières avant d'entrer

## À L'ENTRÉE


Pratiquer l'hygiène des mains


Revêtir la blouse


Porter le masque et la protection oculaire


Enfiler les gants

## À LA SORTIE


Retirer les gants


Retirer la blouse


Retirer la protection oculaire et le masque

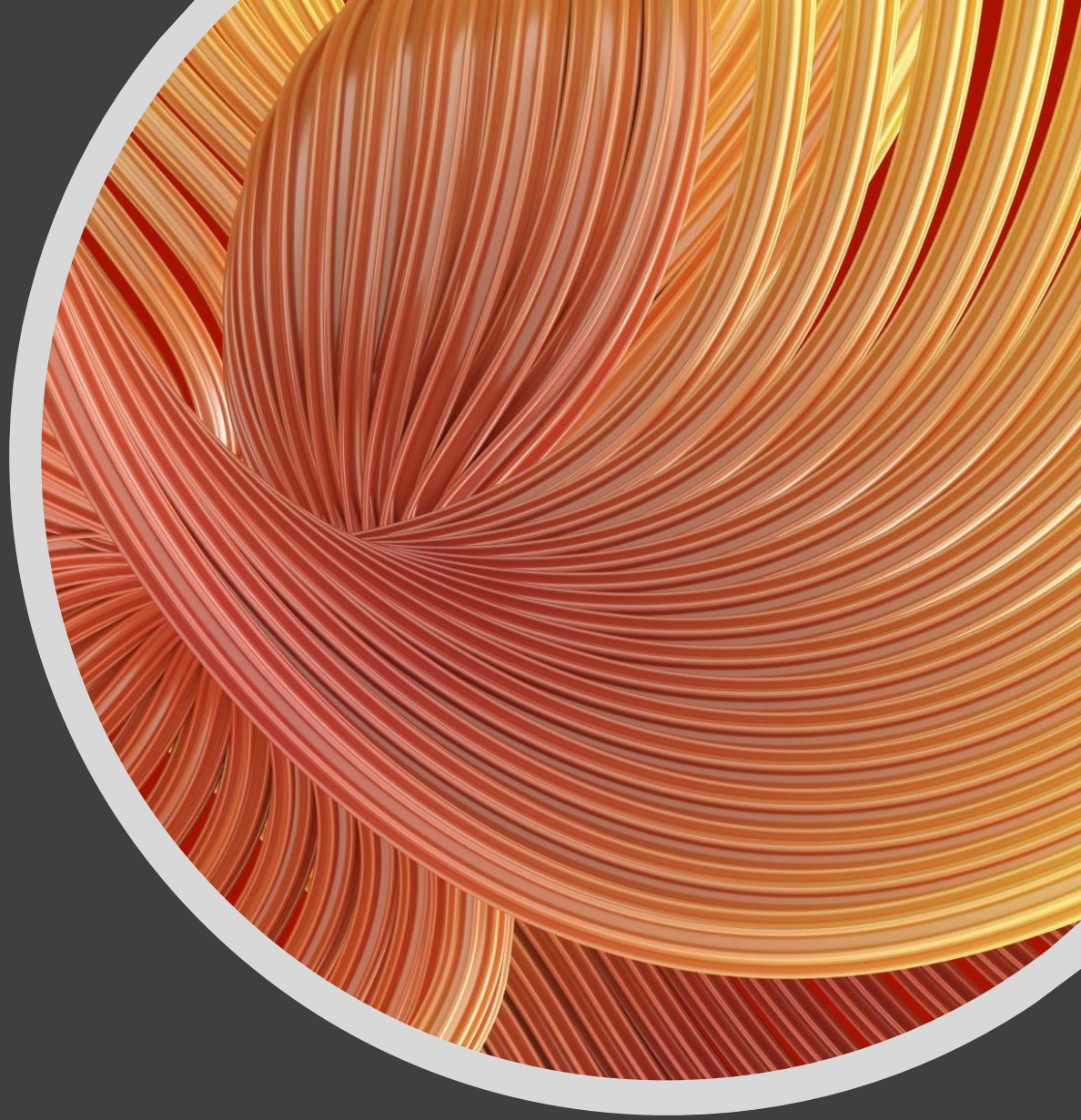

Pratiquer l'hygiène des mains



Matériel dédié ou désinfecté après usage


# Aérienne

- Particules restent dans les airs, restent infectieuse
- Plus petit 5 um
- Filtre à air, et chambre pression négative
- N95
- TB – COVID (lors manœuvres générant aérosols)



# PRÉCAUTIONS AÉRIENNES/CONTACT RENFORCÉES

**Visiteurs** — Se présenter au poste des infirmières avant d'entrer

**ACCÈS INTERDIT SANS AUTORISATION**

## À L'ENTRÉE


Pratiquer l'hygiène des mains


Revêtir la blouse


Porter le masque N-95
Vérifier l'étanchéité


Porter la protection oculaire


Enfiler les gants

## À LA SORTIE


Retirer les gants


Retirer la blouse


Retirer la protection oculaire


Retirer le masque N-95


Pratiquer l'hygiène des mains


Portes et fenêtres fermées

Chambre à pression négative

Matériel dédié ou désinfecté après usage

| | |
|---|---|
| 5.12.3 | Toxic substance in the environment (e.g., volatile agents) |

- + = induction masque, extubation profonde (+ SdR)
- Clé = scavenging system + ventilation
- Si système scavenging et respect des normes respectés: pas évidence de risque
- Problème est qu'on ne connait pas la concentration réelle respiré
- Droit de savoir: effets ''potentiels'' d'avortement spontanée, anomalies congénitales

# Agents inhalés

Sans système scavenging: Concentration inhalé n20: 3000 ppm, halogénés: 50 ppm (anciennes normes)

Depuis système scavengers: 25 ppm, 2ppm

**Table 1. Maximum concentrations (ppm) for anaesthetic gases in countries in an 8-hour working day**

| Country | $N_2O$ | Halothane | Enflurane | Isoflurane | Sevoflurane | Desflurane |
|---|---|---|---|---|---|---|
| USA/NIOSH | 25 | 2 | 2 | 2 | 2 | 2 |
| USA/ACGIH | 50 | 75 | | | | |
| Austria | | 5 | | | | |
| Denmark | 100 | 5 | 2 | | | |
| France | | 2 | | | | |
| Germany | 100 | 5 | 20 | | | |
| United Kingdom | 100 | 10 | 50 | 50 | | |
| Italy | 100 | | | | | |
| Norway | 100 | 5 | 2 | 2 | | |
| Sweden | 100 | 5 | 10 | 10 | | |
| Switzerland | 100 | 5 | 10 | 10 | | |

USA/NIOSH: United States of America/The National Institute for Occupational Safety and Health; USA/ACGIH: United States of America/American Conference of Governmental Industrial Hygienists

**TABLE 88.2** Occupational Exposure, Risks, and Safety Measures

| Exposure | Sources | Potential Risks | Protection |
|---|---|---|---|
| Inhalational agents | Free gases<br>Mask inductions<br>Use of LMA<br>Agent spill<br>Inadequate scavenging | Infertility<br>Decrease in psychomotor performance<br>Cancer development<br>Spontaneous abortion<br>Hepatic disease<br>Congenital abnormalities | Scavenging systems<br>Air exchange<br>Use mask induction appropriately<br>Activated charcoal filters |
| Ionizing radiation | Portable fluoroscopy<br>Hybrid operating rooms<br>Interventional suites | Cancer<br>Eye damage<br>Infertility | Distance >3 feet from source<br>Lead aprons<br>Leaf shields<br>Lead surgical caps<br>Periodic radiation monitoring |
| Nonionizing radiation | LASER | Eye injury<br>Vaporization of bacterial or viral matter | Protective eyewear<br>Laser-specific surgical masks |
| Microdebris from smoke | Surgical cautery<br>Ultrasonic scalpel | Exposure to bacterial, viral, and carcinogenic matter | Surgical smoke evacuators<br>FFP 2 particulate masks |

# Guide pratique anesthésie 2025

## 3.2 Gaz résiduels

Recommandations visant à diminuer l'exposition professionnelle aux gaz anesthésiques résiduels:

1. Une ventilation par dilution assurant 20 changements d'air à l'heure (CAH) doit être disponible dans toutes les salles d'anesthésie dans lesquelles des gaz anesthésiques volatils ou du protoxyde d'azote ($N_2O$) sont utilisés.
2. La recirculation de l'air vicié ne sera pas permise durant les heures d'activité de la salle d'opération et n'est pas recommandée en toute autre période.
3. Partout où un système d'administration de gaz anesthésiques est utilisé, un système d'évacuation doit être mis en place afin de recueillir les gaz anesthésiques qui peuvent s'échapper du circuit d'anesthésie ou du ventilateur.
4. Un programme d'entretien doit être mis en place dans chaque établissement de soins de santé afin de détecter et de réparer toute fuite du système de distribution des gaz anesthésiques et de veiller au bon fonctionnement

du système d'évacuation des gaz anesthésiques résiduels.

5. L'établissement de santé sera responsable d'effectuer une surveillance régulière de l'exposition aux gaz anesthésiques résiduels. Le protocole de surveillance devrait inclure les personnes et la distribution de l'écoulement de l'air dans les salles évaluées. Lorsque le $N_2O$ est utilisé en SOP, la surveillance du $N_2O$ constitue une façon acceptable de vérifier l'efficacité du système d'évacuation des gaz.
6. Lors de l'utilisation d'agents anesthésiques par inhalation volatils, les techniques d'anesthésie à faible débit total de gaz frais ($\leq$ 1 $L \cdot min^{-1}$) présentent des avantages potentiels, notamment une réduction des émissions de gaz à effet de serre résiduels, des bienfaits pulmonaires et une meilleure rentabilité; ces techniques sont donc recommandées, le cas échéant.

LA SOCIÉTÉ CANADIENNE DES ANESTHÉSIOLOGISTES

# ÉNONCÉ DE PRINCIPE

## Écologisation des salles d'opération : énoncé de principe de la SCA sur la réduction des émissions nocives, des déchets et des coûts

Décembre 2024

| 5.12.4 | Laser |
| --- | --- |

- **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation
- Non ionisant mais dangerosité ( intensité et matières relâchées)
- Blessures: - blessures oculaires: radiation directe ou indirecte
- Brûlures rétine/cornée, destruction macula, nerf optique, cataracte
- Protection indiquée sur la lunettes (en nm – exemple: lunettes plastique bloque infra-rouge 10,600nm du CO2 laser, mais pas infra-rouge 1064 nm radiation du Nd:YAG laser
- Fumée: bactéries, ADN - aspirateur

CUAJ | JAUC
Canadian Urological Association Journal | Journal de l'Association des urologues du Canada

▸ Can Urol Assoc J. 2020 Sep 8;14(12):380–382. doi: 10.5489/cuaj.6941

# Canadian Urological Association best practice report: Holmium:YAG laser eye safety

## Summary and recommendations.

1. After over 20 years of extensive use, no eye injuries have ever been reported with the Ho:YAG laser.
2. Based on recent experimental data, it is evident that there is no damage to the unprotected eye unless the laser is fired very close to the eye (within 5 cm of the cornea).
3. Current evidence does not support mandatory safety eyewear for all OR personnel.
4. For operating surgeons who may already be wearing prescription glasses, laser goggles over glasses leads to significant visual impairment and could affect the surgeon's ability to identify important visual cues.
5. Standard prescription eyeglasses are as protective as laser safety goggles.
6. Those who do not wear prescription glasses and may be in close proximity to the laser fibre (within 5 cm) may wish to consider protective eyewear.

5.13 Demonstrate an understanding of the potential risks encounter during practice and potential prevention strategies, including but not limited to:

- 5.13.1 Physical injury related to patient lifting
- 5.13.2 Noise pollution
- 5.13.3 *Post Traumatic Stress Disorder (PTSD) after adverse events*
- 5.13.4 Fatigue
- 5.13.5 Substance abuse
- 5.13.6 Suicide and other mental illness

| 5.13.1 | Physical injury related to patient lifting |
| --- | --- |

Features| December 2019

# Physical Hazards in the Anesthesiologist's Workplace

Mary Ann Vann, M.D., FASA;

Jonathan D. Katz, M.D.

*ASA Monitor* December 2019, Vol. 83, 16–18.

Anaesthesia 2021, 76, 1635–1647 doi:10.1111/anae.15530

Guidelines

# Ergonomics in the anaesthetic workplace

Guideline from the Association of Anaesthetists

**C. R. Bailey,[1] S. Radhakrishna,[2] K. Asanati,[3] N. Dill,[4] K. Hodgson,[5] C. McKeown,[6] A. Pawa,[7] F. Plaat[8]** and **A. Wilkes[9]**

# Blessure

Travailleurs santé plus risque blessures au travail que le secteur manufacturier et de la construction!

MSK = 40% des absences ‘’maladies’’

1ere articulation métacarpo-phalangienne – OA + fréquente

Dos, Épaule

Surtout déplacement bénéficiaire

# Recommandations

- Prendre position neutre et naturel le plus possible
- Lorsque possible – patients devraient se positionner eux-mêmes sur la table/civière pour procédure
- TOUT l'équipement acheté d'un pt de vue ''ergonomique'' et ajustable pour confort anesthésiste, incluant handicapé et grossesse
- TOUT le personnel SOP devrait avoir de la formation obligatoire dans la manipulation
- Température salle devrait être 21 degré, humidité 40-70%, luminosité adéquate, et son maximal (par moment) de 80db
- Hauteur patient; ombilicus, T10, hanche
- Pour intubation: front patient = appendice xiphoïde de l'anesthésiste (mamelons)
- Techniques: table côté main dominante, U/S opposé, moniteur niveau yeux

# 5.13.2 Noise pollution

- Durée et intensité (décibel)
- Maximum: 90 db pendant 8 hre (chaque augmentation de 5 db, diminue de moitié le temps! 100 db = 2hres!)
- Hôpital: moins de 45db

**Table 3-3** Comparative Noise Levels

| Source | Noise Intensity |
|---|---|
| EPA recommendation | 45 dB |
| Continuous suction | 75–85 dB |
| Clang of instruments | 75–85 dB |
| Surgical saw | 80–105 dB |
| Music | 75–105 dB |
| Average OR noise | 77 dB |
| OSHA limit (8 h) | 90 dB |
| Subway | 100 dB |
| OSHA limit (0 h) | 115 dB |

EPA, Environmental Protection Agency; OSHA, Occupational Safety and Health Administration.

*Anaesthesia*, 1994, Volume 49, pages 982–986

REVIEW ARTICLE

# Noise pollution in the anaesthetic and intensive care environment

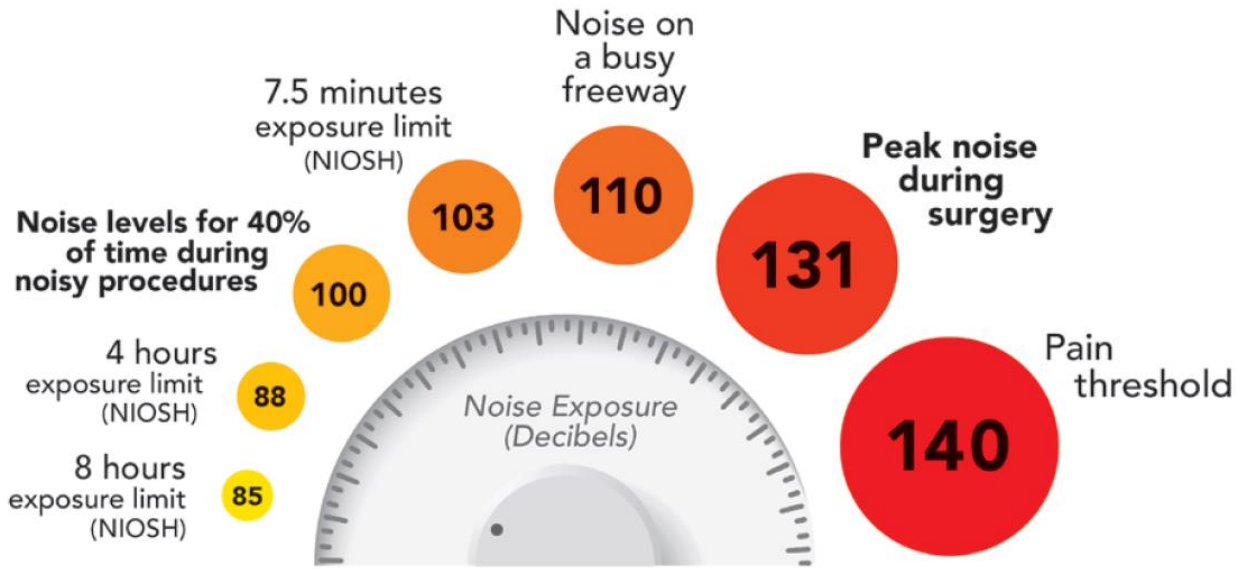
P. C. A. KAM, A. C. KAM AND J. F. THOMPSON

CLINICAL CONCEPTS AND COMMENTARY

*Jerrold H. Levy, M.D., F.A.H.A., F.C.C.M., Editor*

# Noise in the Operating Room

Jonathan D. Katz, M.D.


Noise on a busy freeway
7.5 minutes exposure limit (NIOSH)
103
110
Peak noise during surgery
131
Noise levels for 40% of time during noisy procedures
100
4 hours exposure limit (NIOSH)
88
Noise Exposure (Decibels)
Pain threshold
140
8 hours exposure limit (NIOSH)
85

# Pollution sonore

- Pour s’entendre parler, ajout 20db par-dessus le bruit de fond
- 66% des anesthésistes auraient des audiogrammes anormaux!
- Performance / cognition / communication / mémoire
- Long terme – perte audition, tinnitus
- Effets cardio par réponse adrénergique
- Musique? Oui et non.

# 5.13.4 Fatigue

apsf®
www.apsf.org

NEWSLETTER

The Official Journal of the Anesthesia Patient Safety Foundation

Volume 20, No. 1, 1-24 Circulation 75,648 Spring 2005

## *Fatigue* & the Practice of Anesthesiology

*by Steve Howard, MD, Guest Editor*

**Everyone has seen it.** *For example, watching a colleague fall asleep at a meeting or watching an intern struggle to remain alert while holding a surgical retractor. Everyone has felt it. Eyelids get heavy and the environment starts to "grey out." Ask yourself if you desire to be cared for by health care workers who look and feel this way. This clearly is a dangerous situation for our patients. It is also unsafe for the practitioner when you consider the possibility of harm due to occupational injury (e.g., needlesticks) and the increased risk of driving while sleepy.*

This edition of the *APSF Newsletter* will focus on fatigue and the anesthesia care provider. There is renewed interest in this topic, and we have gathered a cadre of individuals who will present important new information on this topic. Anesthesiology has been very forward-looking regarding many aspects of safety, and there is again an opportunity to be at the "cutting edge" in dealing with this pervasive problem. We hope that the material in this issue will encourage others in our field to join with us to change the manner in which we practice and care for patients.

Fatigue and Safety Anesthesia providers, like all health care

■ REVIEW ARTICLE

*David C. Warltier, M.D., Ph.D., Editor*

Anesthesiology 2002; 97:1281–94



## *Fatigue in Anesthesia*

### *Implications and Strategies for Patient and Provider Safety*

Steven K. Howard, M.D.,* Mark R. Rosekind, Ph.D.,† Jonathan D. Katz, M.D.,‡ Arnold J. Berry, M.D., M.P.H.§

# Conséquences fatigue

| |
|---|
| Performance (augmentation temps réaction, perte mémoire, tr. communication) |
| Niveau alerte |
| Niveau bien-être |
| qualité d’anesthésie |
| risque erreur |
| risque accidentel |
| 17hre en ligne = 0,05% ROH, 24h: 0,1% |

# Solutions?

- Hygiène de sommeil
- Heures limitées
- Gardes limitées
- Sieste
- caféine
- Saine gestion
- Pause
- Modèle pilote d’avion?

**Table 7. Work Hour Regulations in Transportation**

Aviation (14 CFR Part 121; 14 CFR 135).
- Pilots flying domestic air carriers, such as major airlines and cargo haulers, who fly large transport aircraft operations (Part 121) may fly up to 30 h/wk, 100 h/mo, and 1000 h/yr.
- Pilots flying domestic commercial air carriers, commonly referred to as commuter airlines and air taxis (Part 135), may fly up to 34 h/wk, 120 h/mo, and 1200 h/yr.
- If the scheduled flight time is $<$ 8 h, the minimum rest period in the 24 h preceding the scheduled completion of the flight segment is 9 h. This time may be reduced to 8 h if the following rest period, to begin no later than 24 h after the commencement of the reduced rest period, is increased to 10 h.
- If the scheduled flight time is 8 or 9 h, the minimum rest period in the 24 h preceding the scheduled completion of the flight segment is 10 h. This time may be reduced to 8 h if the following rest period, to begin no later than 24 h after the commencement of the reduced rest period, is increased to 11 h.
- If the scheduled flight time is $\geq$ 9 h, the minimum rest period in the 24 h preceding the scheduled completion of the flight segment is 11 h. This time may be reduced to 9 h if the following rest period, to begin no later than 24 h after the commencement of the reduced rest period, is increased to 12 h.

Rail (49 U.S.C. 211; 49 CFR Part 228)
- Maximum duty limit of 12 h
- Must be off duty for 10 consecutive hours after working 12 consecutive hours or off 8 consecutive hours if worked $<$ 12 consecutive hours
- Time spent in transportation to duty assignment counts toward on-duty time.
- Time spent in transportation from duty assignment does not count toward on-duty or off-duty time.

Motor Carrier (49 CRE Part 395)
- Drivers may drive for 10 h or be on duty for 15 h.
- Drivers must have 8 consecutive hours off following a duty period of 10–15 h.
- If drivers use a sleeper berth, they may split the 8-h period into two periods as long as neither period is less than 2 h.
- Drivers may not exceed 70 h in 8 days if the carrier operates 7 days a week.
- Drivers may not exceed 60 h in 7 days if the carrier does not operate every day of the week.

Maritime (46 U.S.C. 8104; 46 CFR Parts 15.705, 15.710, and 15.1111)
- Hours-of-service or watch requirements vary depending on type of vessel.
- An officer must be off duty for at least 6 h within the 12 h immediately before leaving port before taking charge of the deck watch on a vessel when leaving port.
- On an oceangoing or coastwise vessel of not more than 100 gross tons, a licensed individual may not work more than 9 of 24 h when in port or more than 12 of 24 h at sea, except in an emergency or a drill.
- On a tanker, a licensed individual or seaman may not work more than 15 h in any 24-h period or more than 36 h in any 72-h period, except in an emergency or a drill.
- Officers in charge of navigational or engineering watch on board any vessel that operates beyond the boundary line shall receive a minimum of 10 h rest in any 24-h period. The hours of rest may be divided into no more than two periods, of which one must be at least 6 h in length. The hours of rest do not need to be maintained in an emergency. The hours of rest may be reduced to 6 h if no reduction extends beyond 2 days and $<$ 70 h of rest are provided in each 7-day period.

Data from Code of Federal Regulations Web site. Available at: http://www.access.gpo.gov/nara/cfr/waisidx_02/14cfrv2_02.html. Accessed 7/1/02.

# Guide pratique anesthésie 2025 – 2.3 – Santé et bien-être des médecins

Les recommandations spécifiques sont les suivantes :

- Dans la mesure du possible et compte tenu des limites créées par la forte demande de ressources des salles d'opération (SOP), il convient de dissuader la planification de procédures non urgentes pendant les heures défavorables par l'administration des établissements et de la SOP.
- **La disponibilité d'un espace de repos calme et sécuritaire (p. ex., chambre de garde) pour les anesthésiologistes lorsque leur présence est requise à l'hôpital. Il faut envisager d'utiliser cet espace ou de mettre à disposition un autre espace d'expression du lait pour les médecins qui allaitent.**
- La mise en œuvre d'une certaine flexibilité avec le personnel, dans la mesure du possible, afin de permettre de couvrir les médecins souffrant de fatigue ou d'épuisement ou les congés imprévus pour des raisons de santé personnelle ou familiale.
- La planification des horaires des salles d'opération de manière à offrir les pauses nécessaires pour répondre

aux besoins physiologiques personnels et pour se sustenter.

- La promotion, auprès des départements et des établissements, de la création d'équipes de soins d'anesthésie incluant des assistants et assistantes en anesthésie afin d'améliorer à la fois la sécurité des personnes soignées et la santé des médecins.
- S'assurer de la disponibilité, pour les médecins en anesthésie, d'une aide adéquatement qualifiée en tout temps, en particulier dans les endroits hors salle d'opération et après les heures de travail habituelles pour les cas d'urgence, et dans les services où les anesthésiologistes doivent couvrir plusieurs services (p. ex., SOP plus travail obstétrical et accouchement).
- La création de départements qui soient culturellement sécuritaires et qui disposent des mécanismes appropriés pour lutter contre le harcèlement et l'intimidation en milieu de travail, avec des politiques de tolérance zéro à l'égard de la discrimination fondée sur le sexe, la race, la culture, la sexualité ou le handicap.

- La mise sur pied d'un système d'intervention formel, de soutien et de politiques administratives à l'égard du personnel et des personnes inscrites au programme de résidence à la suite d'événements stressants (p. ex., événements indésirables critiques, décès imprévus, plaintes de la patientèle) ainsi que le recours à du personnel de gestion adéquatement formé à l'élaboration de comptes rendus et/ou au soutien suite à des incidents critiques; ce personnel devra être capable de fournir un soutien par les pairs en respectant les cadres reconnus.
- La proposition d'une voie digne vers la retraite, y compris de stratégies de réduction des gardes et l'accès à des cas de moindre urgence ou complexité, le cas échéant et lorsque disponibles.

# 5.13.5 Substance abuse

## Substance abuse in anaesthetists

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Can J Anesth/J Can Anesth (2017) 64:211–218
DOI 10.1007/s12630-016-0775-y

SPECIAL ARTICLE

## The identification and management of substance use disorders in anesthesiologists

## L'identification et la prise en charge des troubles de consommation de substances chez les anesthésiologistes

Can J Anesth/J Can Anesth (2017) 64:219–235
DOI 10.1007/s12630-016-0780-1

CONTINUING PROFESSIONAL DEVELOPMENT

## The impaired anesthesiologist: what you should know about substance abuse

Stefan T. Samuelson, MD · Ethan O. Bryson, MD

EJA

*Eur J Anaesthesiol* 2021; **38**:682–683

EDITORIAL

## Substance abuse by anaesthesiologists, shouldn't we do more?

Patrice Forget and Alexander Baldacchino

# Abus substance

- 15% des docteurs deviennent dépendant substance
- 3,5% des anesthésistes deviennent dépendant aux drogues (inclut ROH), 2,5% sans ROH
- Anesthésiste toujours sur-représenté (ex. programme aide médecins: 12% versus 3,4% autres md)
- Mortalité professionnelle – plus dangereux que pompier

# Fx risques

- Histoire d’abus substance
- Environnement stressant
- Manque reconnaissance profession
- Pauvre estime de soi
- Accessibilité substance

## **Table 3-8** Signs of Substance Abuse and Dependence

Within the practice of anesthesia
- Signing out increasing quantities of narcotics/hypnotics (often inappropriately high for the case)
- Volunteering for cases requiring high-dose narcotics
- Arriving early, staying late, taking extra call, and offering extra breaks to gain access to drugs (or calling in sick in the case of alcoholics)
- Refusing lunch or breaks, personally administering medications in the recovery room, and preferring to work alone to mask drug diversion behavior
- Asking for additional bathroom breaks, or staying in bathroom for long periods to use drugs
- Being difficult to locate after breaks, as naps often follow drug use
- Wearing long sleeves to hide needle marks
- Illegible or sloppy charting
- Frequent changes in job to maintain the secret

Behavioral changes
- Mood swings and emotionally labile
- Social withdrawal (from people and previously enjoyed activities)
- Increased impulsivity
- Leaving drug paraphernalia (bloody swabs, needles, etc.) in common areas
- Decreased sexual drive
- Increased domestic strife

Physical signs
- Pinpoint pupils
- Long sleeves worn due to cold sensitivity (associated with narcotics)
- Alcohol odor on the breath or witnessing IV drug use
- Weight loss and pallor
- Narcotic withdrawal (sweating, tremors)
- Coma and death—unfortunately a not uncommon presenting symptom

| 5.13.6 | Suicide and other mental illness |
|---|---|

ANAESTHESIA

# Risk of mortality and suicide associated with substance use disorder among healthcare professionals

## A systematic review and meta-analysis of observational studies

Rodrigues, Joao Vitor da Silva; Pereira, José E. Guimarães; Passarelli, Luisa Almeida; Guatura, Gabrielle M.G.B.; El Dib, Regina

Author Information

European Journal of Anaesthesiology: July 2021 - Volume 38 - Issue 7 - p 715-734
doi: 10.1097/EJA.0000000000001447

# Suicide et anesthésie

Odds ratio anesthésiste versus autres MD : mortalité par abus substance: 2,69, suicide: 2,18

Susceptibilités: Anxiété +, insécurité, faible estime de soi, impulsivité, et faible auto-contrôle

20% des anesthésistes auraient le ‘’profil’’ si stress extreme

Facteurs stress spontanée: poursuite, événements catastrophiques indésirables

# Conclusion

- Plus belle spécialité du monde
- Risques Professionnels ÉLEVÉS
- Plusieurs sections pour collège royal
- Feu – algorithme
- Clé? Équilibre – repos, professionnalisme, SÉCURITÉ