Presenter Disclosures

Andrea Steege

(1) The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

"No relationships to disclose"

Surgical Smoke and Healthcare Worker Health & Safety

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What is surgical smoke?

- By-product of thermal destruction of tissue by lasers or electrosurgical devices (including electrocautery or diathermy)

- May contain toxic gases, vapors and particulates, viable and non-viable cellular material, viruses and bacteria

Health effects of surgical smoke

Acute

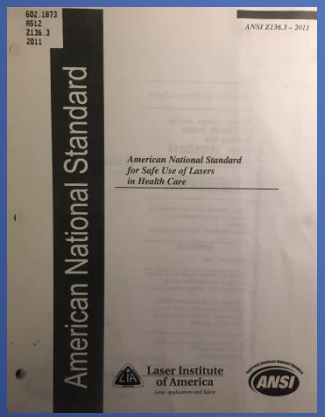
- Eye, nose and throat irritation
- Headaches
- Nasal congestion
- Nausea, dizziness
- Coughing
- Asthma and asthma-like symptoms

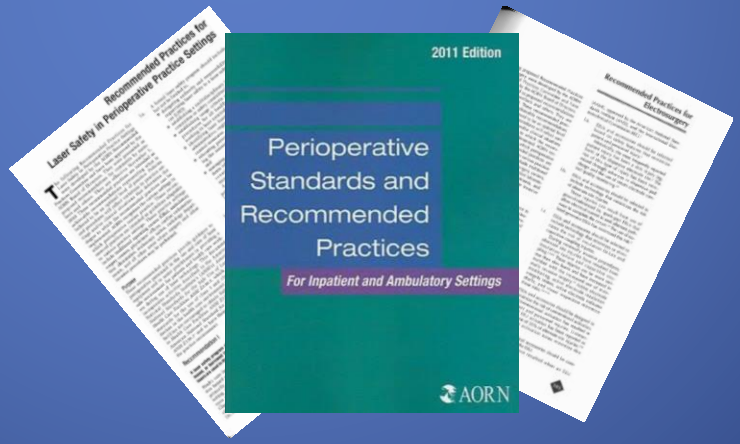
Chronic

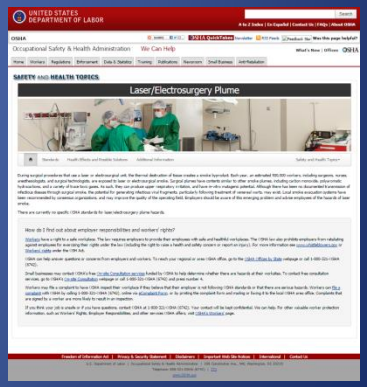
- Inflammatory changes (e.g. emphysema, asthma, chronic bronchitis)

Health and Safety Guidelines for Working around Surgical Smoke

- Developed by professional practice organizations and government agencies
- Specify evidence-based practices and exposure controls where surgical smoke is generated
- Served as the basis for questions addressing exposure controls







Background and Purpose of Survey

- This presentation draws from information collected by the ***NIOSH Health and Safety Practices Survey of Healthcare Workers***
- Purpose: Describe extent of use of exposure controls and barriers by healthcare workers who handle or come in contact with hazardous chemicals

Survey Methods

- Voluntary, anonymous, web-based survey of healthcare workers conducted in early 2011
- Invited to participate through professional practice organizations representing workers likely to be exposed to selected chemical agents of concern
- Organization sent email invitations with web survey links to their members

Survey Methods

- A screening module asked respondents about their exposures and routed them to appropriate hazard modules, including one on Surgical Smoke
- Eligible respondents responded yes to the question: "At any time in the **past 7 calendar days**, did you work within 5 feet of the source of **SURGICAL SMOKE**?"

Survey Methods

- As part of the Surgical Smoke module they were asked, At any time in the past 7 calendar days, did you work within 5 feet of the source of surgical smoke during:
  - Laser Surgery?
  - Electrosurgery?
- Laser surgery and electrosurgery were addressed in separate submodules due to differences in previously reported practices and guidelines.
- Each submodule included the same 19 questions. Respondents could answer questions in one or both submodules.

Results

- 4,533 total respondents
- 4,500 responded they were exposed to surgical smoke during Electrosurgery
- 1,392 responded they were exposed to surgical smoke during Laser surgery

Demographics

- Female 61%
- White 91%
- Age 41-55 years 45%
- Occupation
  - Nurse 56%
  - Anesthesiologist 21%
  - Surgical Technologist 16%
  - Other 7%

Employer Characteristics

- Employer
  - Hospital 83%
  - Ambulatory Care Services 16%
- Number of employees at workplace
  - <10 5%
  - 10-99 20%
  - 100-249 12%
  - 250-1000 29%
  - >1000 34%

Exposure Characteristics

- Years working around surgical smoke

Years	Laser surgery	Electro-surgery
<1	2%	2%
1-5	15%	15%
6-10	15%	15%
11-20	26%	25%
>20	41%	43%

Exposure Characteristics

- Days working around surgical smoke of the past 7

Days	Laser surgery	Electro-surgery
1	71%	10%
2	15%	12%
3	7%	21%
4	4%	20%
5	3%	30%
6-7	1%	7%

Exposure Characteristics

- Hours working around surgical smoke in the past 7 days

Hours	Laser surgery	Electro-surgery
<1	61%	16%
1-5	3%	32%
6-20	6%	30%
21-40	2%	19%
>40	1%	3%

Exposure Characteristics

- Number of surgical procedures working around surgical smoke in the past 7 days

Procedures	Laser surgery	Electro-surgery
1	52%	5%
2-5	42%	26%
6-10	4%	32%
11-25	1%	29%
>25	<1%	7%

Training received on hazards of surgical smoke

Training	Laser surgery	Electro-surgery
Within 12 months	23%	24%
>12 months ago	29%	32%
Never	49%	44%

Employer has standard procedures that address potential hazards of surgical smoke

Procedures	Laser surgery	Electro-surgery
Yes	30%	31%
No	31%	29%
I don't know	39%	40%

Use of Local Exhaust Ventilation (LEV)

LEV used	Laser surgery	Electro-surgery
Always	47%	14%
Sometimes	22%	26%
Never	31%	59%

Reasons for not using LEV

	Laser surgery	Electrosurgery
Not part of our protocol	28%	33%
Exposure was minimal	24%	21%
Not provided by employer	23%	25%
Used a different system to remove smoke	21%	36%
General room ventilation was sufficient	20%	29%

Use of respirators (N95, ½ facepiece, PAPR)

Respirator used	Laser surgery	Electro-surgery
Always	6%	1%
Sometimes	4%	3%
Never	90%	96%

Reasons for not using respirators

	Laser surgery	Electrosurgery
Not part of our protocol	48%	56%
Exposure was minimal	31%	33%
Not provided by employer	27%	23%
Not readily available in work area	24%	23%
No one else uses them	15%	21%

Discussion

- Local Exhaust Ventilation is not widely used
- This is especially true for electrosurgery where workers report more days, hours, and procedures

Discussion

- Our results indicate workplaces do not prioritize control of surgical smoke
  - Lack of training
  - Lack of facility procedures for preventing exposure to surgical smoke
  - Reasons given for not using LEV:
    - not part of our protocol
    - exposure was minimal
    - not provided by employer
- These results echo work by Ball (2010) who found education and training as well as leadership support influence compliance with recommendations.

Limitations

- Not a representative sample of all healthcare personnel exposed to surgical smoke
- Information was not collected on type of surgical procedure performed
- No information was collected on what type of "other system" was used when respondents did not use LEV
- Respondent not the primary person in charge of ensuring LEV was used

Conclusions

- Point source control of surgical smoke has been recommended for many years. Despite this, use of LEV is lacking.
- Employers need to ensure that: workers are aware of hazards; national guidelines are in place and support for their implementation is understood; LEV is available and workers are trained on its use.
- Workers can: seek out training; understand and follow facility procedures; ask questions and report any safety concerns.

Other publications from the **Health & Safety Practices Survey of Healthcare Workers**

- Silver et al. In press. Predictors of adherence to safe handling practices for antineoplastic drugs: survey of hospital nurses
- Boiano et al. 2015. Adherence to Precautionary Guidelines for Compounding Antineoplastic Drugs: A Survey of Nurses and Pharmacy Practitioners
- Boiano et al. 2015. Ethylene Oxide and Hydrogen Peroxide Gas Plasma Sterilization: Precautionary Practices in U.S. Hospitals
- Tsai et al. 2015. Precautionary Practices of Respiratory Therapists and Other Health-Care Practitioners Who Administer Aerosolized Medications
- Boiano et al. 2014. Adherence to Safe Handling Guidelines by Health Care Workers Who Administer Antineoplastic Drugs
- Henn et al. 2014. Precautionary Practices of Healthcare Workers Who Disinfect Medical and Dental Devices Using High-Level Disinfectants
- Steege et al. 2014. NIOSH Health and Safety Practices Survey of Healthcare Workers: Training and Awareness of Employer Safety Procedures

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