

SURGICAL PLUME THE HAZARDS

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ARE YOU STILL “SMOKING” IN
SURGERY ?

IT'S TIME TO CLEAR THE AIR !





TOO MUCH INFORMATION TOO LITTLE ANALYSIS

PLUME MANAGEMENT SHOULD BE
EVIDENCE BASED, APPLICABLE,
PRACTICAL AND SUSTAINABLE

SITUATIONAL AWARENESS

- **ARE THERE HAZARDS ? IF SO, WHAT ARE THEY ?**
- **WHAT ARE THE RISKS ? WHO IS AT RISK ?**
- **WHAT IS CURRENT PRACTICE – DOES IT WORK ?**
- **WHAT ARE THE BARRIERS TO COMPLIANCE ?**
- **WHO ARE THE KEY STAKEHOLDERS ?**
- **WHAT ARE THEIR GOALS ?**

IS THERE A HAZARD ?

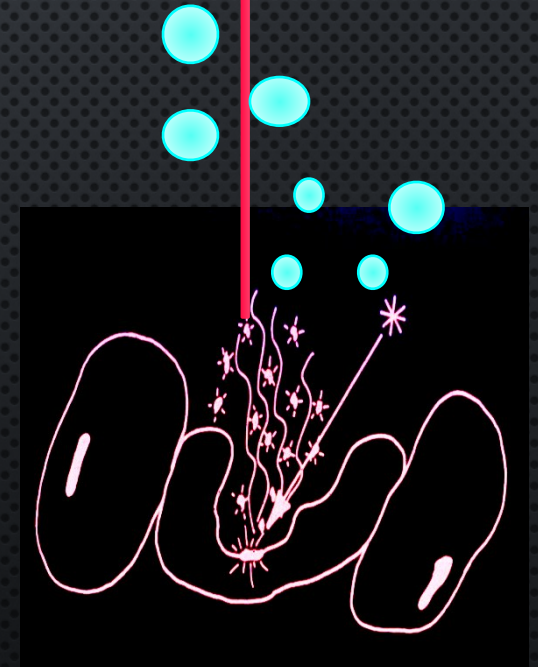
PLUME IS THE RESULT OF VAPOURISING TISSUE -
95% OF ALL SURGICAL CASES

ENERGY BASED DEVICES CREATE SURGICAL PLUME

- LASERS
- ELECTROSURGICAL UNITS
 - HIGH FREQUENCY
 - PLASMA GENERATORS
 - ULTRASONICS

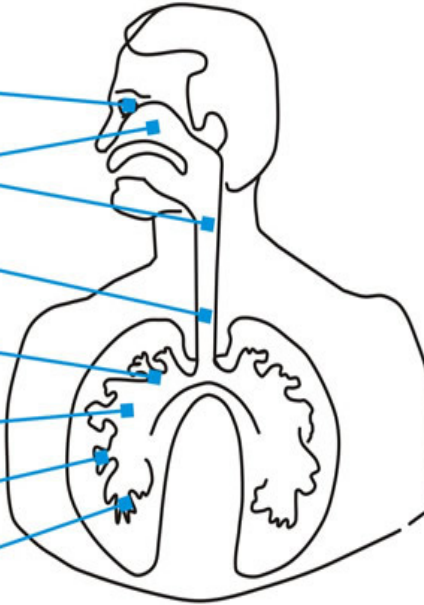


- **Heat From Energy Based Devices Is Absorbed In Intracellular Water.**
- **Cells Expand When Heating Occurs, And Disrupt At 100° C.**
- **Content Of Cells Is Released, And Becomes Airborne as Smoke**
- **If Not Captured, the Plume Can Reach and Enter, Breathing Zones.**



WHAT ARE THE HAZARDS ?

| Particle size | Fate |
|-------------------------|--------------------------------------|
| 9 - 30 μm | visual pollution |
| 5.5 - 9 μm | settle in nose/throat |
| 3.3 - 5.5 μm | lodge in main breathing passages |
| 2 - 3.3 μm | lodge in small breathing passages |
| 1 - 2 μm | lodge in bronchi |
| 0.3 - 1 μm | penetrate to bronchioles and alveoli |
| 0.1 - 0.3 μm | penetrate to bronchioles and alveoli |



- Carbon
- Aerosolised Blood
- Bacteria
- Viral Particulates
- (HPV, HepB, HIV)
- Viral DNA

What You **Can't** See - **Can** Harm You...

>41 + Gases are Present: Including Benzene, Toluene, Carbon Monoxide, Cyanide, Acrolein, and Formaldehyde

WHO IS AT RISK ?



BASELINE = 60,000 PARTICLES/CF (<EPA LEVELS) – SAFE LEVELS

WITHIN 5 MINUTES :
> 1 MILLION PARTICLES/CF
(>EPA HAZARD LEVELS)

20 MINUTES - RETURN TO BASELINE – SAFE LEVELS

EVERYONE IS EXPOSED EQUALLY*

***Brandon H.J., Young V.L.: “Characterization and Removal of Electrosurgical Smoke”, Surgical Services Management, 1997, Vol. 3/ No. 3**

During a Plume Filled Case, Have You Ever Felt...



- NAUSEA
- SORE THROAT
- COUGH
- NASAL/SINUS CONGESTION
- BRONCHOSPASM
- ASTHMA / ALLERGY
- HEADACHE
- OCULAR IRRITATION
- EXCESSIVE TIREDNESS

Smoke Inhalation – No.1 Cause of Injury During Fires

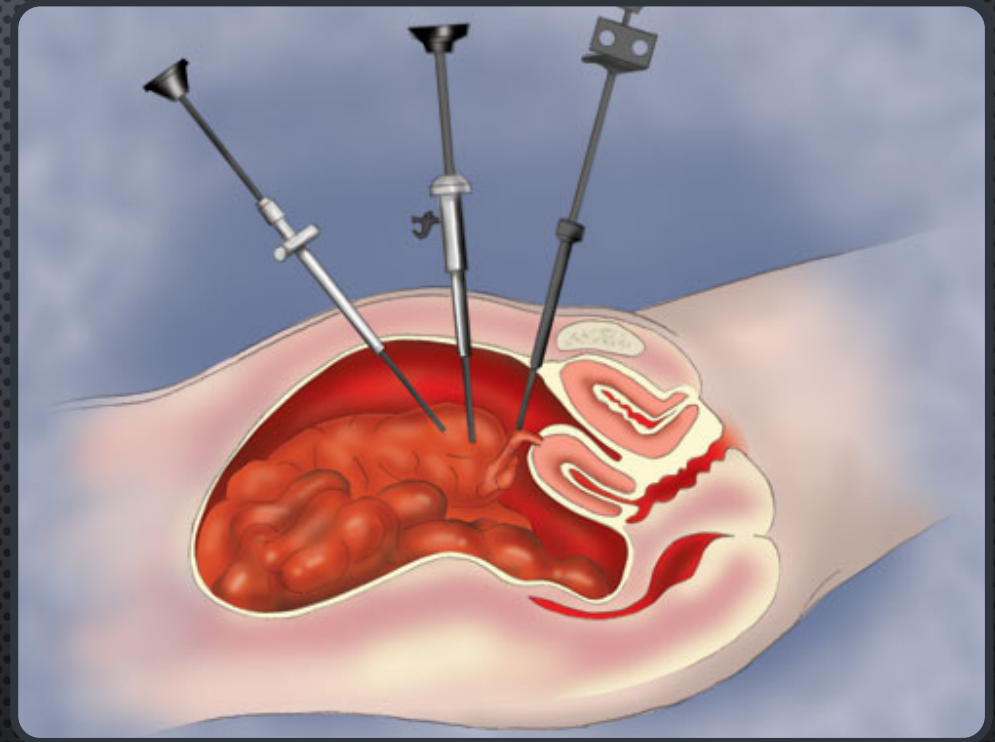


- Rise in abnormal Hgb levels Occurs When You Breathe In The Products Of Combustion
- **Carboxyhemoglobin:** Hgb That Binds Carbon Monoxide Instead Of Normal Oxygen
- **Methemoglobin:** A Form Of Haemoglobin That Is Incapable Of Carrying Oxygen
- Leads To Oxygen Deficiency



PLUME IS A RISK TO PATIENTS DURING LAPAROSCOPY

- **METHEMOGLOBIN AND CARBOXYHEMOGLOBIN LEVELS RISE***
- **REDUCED OXYGEN TO TISSUES**
- **POSTOP Sx: PROLONGED NAUSEA, HEADACHE, DIZZINESS**
- **NON-RECIRCULATING SYSTEMS CAN CAUSE PERITONEAL DEHYDRATION AND HYPOTHERMIA**



*D.Ott, Mercer University, 1993

Chemical Composition of Surgical Smoke Formed in the Abdominal Cavity During Laparoscopic Cholecystectomy – M. Dobrogowski, et.al International Journal of Occupational Medicine and Environmental Health, Feb.,2015

- ▶ UA Carried out Before and After Lap/Chole, For Gases In Plume That Were Absorbed Through The Peritoneum
- ▶ 40 Substances In Intraabdominal Plume During Surgery
- ▶ Post-op Urine Samples Showed **Benzene** and **Toluene** Levels Were Significantly Higher
- ▶ **Benzene** Is Carcinogenic and Can Diffuse Across The Placenta (Fetotoxic)
- ▶ **Toluene** is Neurotoxic – Functional And Developmental Deficits
- ▶ Interactions Increased Overall Toxicity

Who Else is at Risk?

Look Beyond the Operating Theatres

- ▶ Day Surgery Units
- ▶ Dental Units
- ▶ Outpatient Clinics
- ▶ ***Labour /Delivery***
- ▶ Cardiac Cath Lab
- ▶ ITU
- ▶ Hybrid Rooms
- ▶ Interventional Radiology
- ▶ ***Training / Simulation Labs***



Risk Mitigation Depends on Ownership, Administrative Support - *and a Plan !*

1. Become Familiar With Standards, Regulations, National and Professional Guidance Documents
2. Engage Key Stakeholders
3. Establish an Audit Process
4. Gather Internal Evidence
5. Ensure Appropriate Education and Training
6. Build Consensus

Step1: Become Familiar With Evidence and Consensus Based Standards, Regulations, and Professional Guidelines

EN ISO 16571:2014

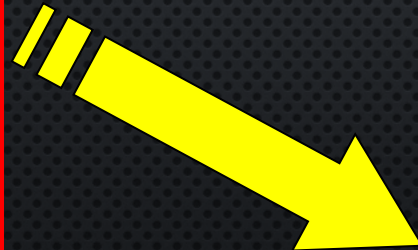




The Operating Theatre is Your **Workplace**

Plume is a Hazard in Your Workplace

THIS IS A
**SMOKE FREE
WORKPLACE**
YOUR COOPERATION
IS EXPECTED



Mandate For Compliance



INTERNATIONAL COUNCIL on SURGICAL PLUME

**We Would Be Proud to
Welcome You As A
Member !**

plumecouncil.com

One Voice Advocacy

**Healthcare Professionals Around the World
Working Together Towards A Common
Goal...**



**Supporting Legislation, Regulations, Standards,
Education, Research, and Facility Based**

What Does it Mean to be 100% Plume Free ?

A Plume Evacuation System Is Used:

**Every Day
Every Room
Every Case**

**Until Every Surgical Team Member,
And Every Patient in Their Care,
Is Breathing Clean Air in Surgery !!!**



IF YOU OR YOUR ESTABLISHMENT REQUIRE FURTHER DETAILS,
OR WISH TO JOIN THE INTERNATIONAL COUNCIL ON SURGICAL PLUME.
WE CAN ALSO OFFER BESPOKE LECTURES, PRESENTATIONS, WORKSHOPS TO
ALL GROUPS, ON ELECTROSURGERY, LASER AND SURGICAL PLUME

CONTACT: SURGIVEX@BTINTERNET.COM OR CALL 0777 1422213