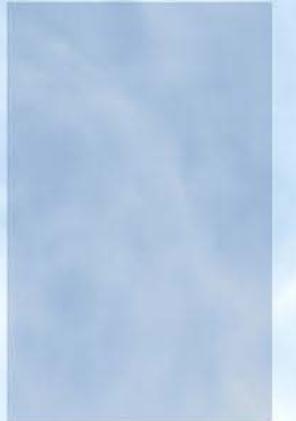




MASSACHUSETTS
Health & Hospital
ASSOCIATION

ELIMINATING SURGICAL SMOKE

in Massachusetts Hospitals



Welcome:



Patricia Noga, PhD, RN, NEA-BC, FAAN

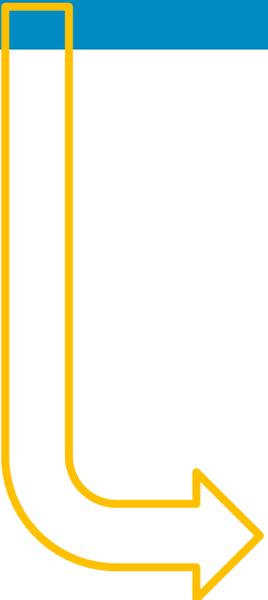
Vice President, Clinical Affairs

Massachusetts Health & Hospital
Association

Opening Remarks:

**Michael Gustafson, MD, MBA
UMass Memorial Medical Center**

MHA BOARD VOTE



Approved: Endorsement of CIAC Surgical Smoke Goal & Action Plan for MHA Members

GOAL

All Massachusetts hospitals will commit to eliminate surgical smoke from their facilities by 2024 by implementing the AORN Go Clear Award Program or similar surgical smoke evacuation program.

ACTION PLAN

1. **Educate the senior leadership** of the organization, including hospital CEO, CMO, CNO, CQO, Chiefs of Surgery, and perioperative leadership team of the long-term hazards of exposure to surgical smoke.
2. **Commit to implementing a policy to eliminate surgical smoke hospital-wide**, including plans for caregiver education on risks, training on use of equipment, investment in appropriate equipment in adequate numbers, tracking of compliance, and recording of potential exposure side effects as part of environmental health and safety monitoring.
3. **Commit to report to MHA** on progress in attaining a surgical smoke-free environment.

Commitment to Eliminate Surgical Smoke by 2024

- Commitment letter sent to acute care hospital CEOs
- Followed by MHA Advisory to CMOs, CNOs, CQOs
- 33 signed commitment forms submitted
- Outreach in process to other professional organizations and key stakeholders
- In-person educational program planned for spring 2023
- Resources for hospitals compiled on *PatientCareLink* site

Building the Case for Eliminating Surgical Smoke

Daniel W. Johnson, RN
Director of Perioperative Services
Emerson Hospital

The Problem: Surgical Smoke

What is Surgical Smoke?

- Like cigarette smoke, surgical smoke can be seen and smelled. It is the result of human tissue contact with lasers and electro-surgical pencils commonly used for dissection and hemostasis during surgery. The smoke has unpleasant odors and has been shown to have mutagenic potential.



The Problem: Surgical Smoke

Which procedures generate surgical smoke?

- Many surgical procedures generate surgical smoke, including common surgeries such as mastectomies, knee replacements and C-section births. Electrosurgical pencils stop the bleeding at the site and offer many benefits to surgeons over a traditional scalpel, yet they cause surgical smoke because of their high temperatures.

The Problem: Surgical Smoke

What is the harm in surgical smoke?

- Surgical smoke contains over 150 hazardous chemicals and carcinogenic and mutagenic cells. It contains toxic gases and vapors such as benzene, hydrogen cyanide, formaldehyde, bioaerosols, dead and live cellular material, blood fragments, and viruses.
- *According to the Environmental Protection Agency, exposure to fine particulate matter in surgical smoke is associated with cardiovascular and respiratory health problems. In addition to causing respiratory illness, asthma, and allergy-like symptoms, surgical smoke may contain viruses, such as HPV. There are documented cases of HPV transmission from patients to providers via surgical smoke inhalation. Surgical smoke can cause cancer cells to metastasize in the incision site of patients having cancer removal surgery. Babies born by C-section breathe in their mother's surgical smoke at birth.*

The Problem: Surgical Smoke

Is there a safe level of exposure for surgical teams?

- No. The average daily impact of surgical smoke to the surgical team is the equivalent of inhaling the smoke of 27-30 unfiltered cigarettes. Perioperative nurses are in the operating room every day for long hours and have the highest exposure levels. These nurses report twice as many respiratory issues as the general population.



The Problem: Surgical Smoke

Why don't all surgeons use evacuation equipment?

- Until recently, surgical team members assumed surgical smoke was harmless, similar to the early beliefs about cigarette smoking. In addition, smoke evacuation equipment used to be loud and bulky. Today, with new technology that is rapidly evolving, the devices are smaller and more effective though too many surgeons and facilities have yet to trial these improved devices.

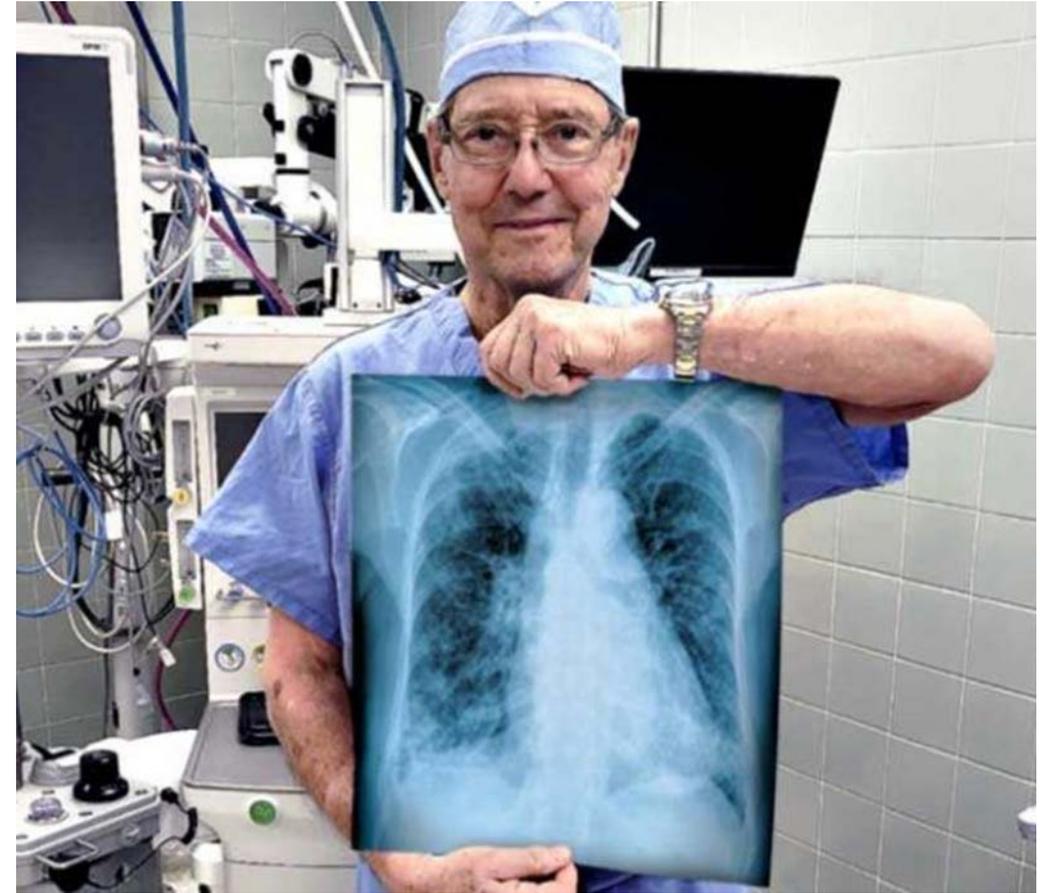
Impact to Health

- Case studies of suspected surgical smoke
 - Oropharyngeal cancers / HPV type 16 and 18
 - Recurrent respiratory papillomatosis / HPV type 6 and 11 (oral warts)
- Smoke from vaporized lesions of bovine papilloma injected into the calves resulted in 100% subsequent fibropapilloma at the injection site
 - Demonstrates live DNA presence, viral viability



Impact to Health

- Double the incidence of respiratory problems in surgical staff.
- Exposure to carcinogenic, mutagenic, and genotoxic substances
- Eye, skin and throat irritation, nausea/vomiting, headache



Uniform Agreement

- National Institute Of Occupational Safety and Health (NIOSH)
- Association of periOperative Registered Nurses (AORN)
- British Occupational Hygiene Society (BOHS)
- International Federation of Perioperative Nurses (IFPN)
- American National Standards Institute (ANSI)
- ECRI

The Joint Commission

EC 02.02.01 EP 09

- Use of smoke evacuators is tied to The Joint Commission's element of performance (EP) for managing hazardous materials and waste. Standard EC 02.02.01, EP 9 states that “the organization minimizes risks associated with selecting, handling, storing, transporting, using, and disposing of hazardous gases and vapors.”

The Joint Commission

Hazardous gases and vapors include, but are not limited to:

- ethylene oxide
- nitrous oxide gases
- vapors generated by glutaraldehyde
- ***cauterizing equipment, such as lasers***
- waste anesthetic gas disposal (WAGD)
- laboratory rooftop exhaust

Equipment Procurement



Equipment Procurement

- Many choices
- Multidisciplinary team
 - Supply Chain / GPO / Value Analysis
 - Nursing / Nurse Educator
 - Surgeon Champions
 - Executive Sponsor
- Workflow – Room setup
- Maximize your contracts – look for opportunities
- Capital vs other

Thank you



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- *Surgical smoke legislation gaining traction across the country*. The Joint Commission. (n.d.). Retrieved November 10, 2022, from https://www.jointcommission.org/resources/news-and-multimedia/blogs/leading-hospital-improvement/2021/06/surgical-smoke-legislation-gaining-traction-across-the-country/#.Y21A_3bMLcs

AORN Massachusetts Chapter 1

Surgical Smoke

Jeffrey Keane

President, AORN Mass Ch. 1



AORN
SAFE SURGERY TOGETHER

Massachusetts Chap 1
CHAPTER 2201

Role of AORN

- Advocate for perioperative staff and leaders
- Provide workplace safety initiatives
- Provide clinical and educational resources



AORN
SAFE SURGERY TOGETHER

Massachusetts Chap I
CHAPTER 2201

Clinical and Educational Resources

- Surgical Smoke Guidelines Essentials
- Management of Surgical Smoke Tool Kit
- AORN Go Clear Award
- Johns Hopkins Smoke-Free Surgery Policy Brief



Smoke Guideline Essentials



Quick View

Quick, instructional video shorts and simple implementation steps

[Launch](#)



Case Studies

Real-life examples that emphasize the importance of following the guideline

[Download](#)



Implementation Road Map

Simple infographic outlining steps for implementing AORN Guidelines

[Download](#)



Gap Analysis Tools

Tools to assess areas in which your facility may not be compliant with the guideline

[Download Gap Analysis](#)
[Download Audit Tool](#)



Key Things to Remember...

Key takeaways from the guideline

[Download](#)



Policy & Procedure Templates

Ready-to-use customizable templates for developing your facility's policies and procedures

[Download Policy & Procedure Template](#)



Clinical FAQs

Answers to popular questions related to the guideline

[View](#)



Competency Verification Tools

Ready-to-use customizable templates for verifying competency to meet facility requirements

[Download](#)



PowerPoint Presentation

Customizable, visual presentation overview of the guideline

[Download](#)



Webinars

Informational webinar addressing key issues

[View](#)



Other Resources

Additional resources related to the guideline including *AORN Journal* articles, tool kits, and online learning courses

[Hierarchy of Controls](#)
[Smoke Evacuation Decision Tree](#)
[State of the Science: A Concept Analysis of](#)



Guideline Essentials Series

See other available topics in the Guideline *Essentials* series

[View](#)

Management of Surgical Smoke Tool Kit

- Power Point presentations to give to staff and leadership
- Awareness Posters
- Scientific research documents for evidence based practice





GO CLEAR AWARD

Surgical Smoke-Free Recognition Program

There are three Go Clear Award designations – Bronze, Silver, and Gold.

Facilities are rated on:

- Education performance
- Smoke evacuation compliance
- Ensuring your facility has sufficient smoke evacuators and accessories

SPONSORED BY MEDTRONIC THROUGH THE AORN FOUNDATION

Johns Hopkins Policy Brief, October 2021

Operating Room Surgical Smoke: Dangers, Protective Measures, and the Way Forward

Wymer, J. A., Schneidewind, M. D., Chambers, C. S., & Martodam, K. R.

Surgical smoke has been a **known workplace hazard** since the Occupational Safety and Health Administration (OSHA) issued the first such alert in 1988.

Over **500,000 healthcare workers** are exposed to electrosurgical smoke every year, and this known hazard impacts surgeons, nurses, surgical assistants, anesthesia providers, equipment representatives, consultants, and technicians.¹

Dangers of Surgical Smoke

Potential health impacts related to surgical smoke exposure: chronic oxidative stress and systemic inflammation, pneumonia, bronchiolitis, asthma, Chronic Obstructive Pulmonary Disease (**COPD**), Coronary Artery Disease (**CAD**), Chronic Heart Failure (**CHF**), a variety of neurologic and psychiatric conditions, and decreased life expectancy.^{1,2}

Figure 1
Surgical Smoke Hazards



Note. Surgical smoke hazards are well documented and typical surgical mask do not adequately protect those who are exposed.²

Operating rooms are known leaders in contributing to positive cash-flow and revenue generation across hospitals and healthcare systems.³ Surgical smoke evacuation is in the industry's financial and ethical best interest and protects both staff and patients. As the surgical patient is most often sedated or unconscious during a procedure, the onus is on the healthcare team to be **advocates for all**.

Surgical Smoke is a Persistent Risk

While there are costs associated with equipment installation, staff education, maintenance, disposables, and program monitoring, the potential for harm from **surgical smoke exposure remains a hazard for too many** in the operating room.

Operating Room Surgical Smoke: Dangers, Protective Measures, and the Way Forward

Wymer, J. A., Schneidewind, M. D., Chambers, C. S., & Martodam, K. R.

Dangers of Surgical Smoke

Hazardous Contents:

Surgical smoke is **95% steam** and **5% particulate matter (PM)**.²

- The majority of PM from surgical sources falls between 100nm and 1µm; PM this size is known to cause cardiovascular and respiratory problems.²
- Surgical masks are largely ineffective** against small PM.²
- Even advanced N95 respirators only filter PM larger than 300nm or 0.3µm.²

Surgical smoke is produced during active use of electrosurgical or laser devices and contains:

Toxic gases, Vapors, Particulates, Cellular material, Viruses, and Bacteria.¹

Table 1 lists some of the hazardous compounds in surgical smoke.

Experimental studies show concentrations of noxious surgical smoke components **exceed recommended exposure limits** for multiple compounds.²

1 gram of cauterized tissue can produce mutagenic compounds equivalent to those found in 3-6 cigarettes and a full surgery equates to the second-hand smoke generated from approximately 1.5 packs of cigarettes.²

Surgical smoke has also been shown to have **cytotoxic, genotoxic, and mutagenic effects**.¹

Table 1

Compounds in Surgical Smoke

Chemical Compounds

Acrolein
Acrylonitrile
Benzene
Carbon monoxide
Formaldehyde
Hydrogen cyanide
Hydrocarbons
Phenols
Nitriles

Biological Compounds

Cytotoxins
Cancer Cells
Viruses
Cellular Debris
Other Blood Borne Pathogens

Note. This is a sample of compounds found in surgical smoke plumes from electrosurgery, laser, and ultrasonic scalpel procedures.¹

Protective Measures

- Current measures:** 1) smoke dispersal in the ambient environment, 2) suction evacuation, or 3) physical barrier filtration such as in-line suction filters and face masks.²
- Future measures:** Electric filters that produce ozone and necessitate an additional carbon filter.²
- Many methods of limiting surgical smoke exposure continue to be perceived as insufficient.²

Operating Room Surgical Smoke: Dangers, Protective Measures, and the Way Forward

Wymer, J. A., Schneidewind, M. D., Chambers, C. S., & Martodam, K. R.

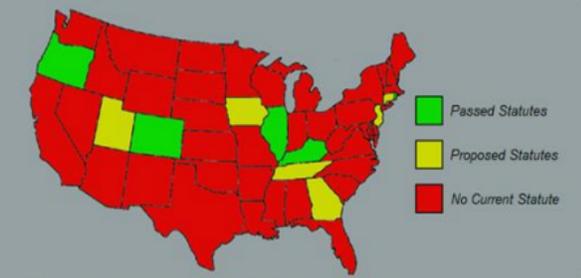
The Way Forward

Five states have adopted smoke-free surgery statutes and six states have proposed or pending legislation (Figure 2).⁴

Newly established statutes and requirements typically take effect 12-18 months after enactment to allow organizations time to acquire relevant equipment, modify local policy, and re-train staff.

Recognizing the significant effort that has occurred over the last three years, there is an urgent need to accelerate the shift to a national smoke-free surgery standard.

Figure 2
Passed and Proposed Smoke-Free Statutes



Note. Passed smoke-free surgery statutes: Colorado, Illinois, Kentucky, Oregon, Rhode Island. Proposed smoke-free surgery statutes: Connecticut, Georgia, Iowa, New Jersey, Tennessee, Utah.

Take Action and Get Involved

The **Association of periOperative Registered Nurses (AORN)**, representing more than 42,000 operating room nurses, advocates for Smoke-Free Surgery at the state and federal level as well as through their Go Clear Award Program.⁴

AORN is actively collecting signatures in support of OSHA action to develop a rule mandating surgical smoke evacuation. Such a rule would create a unified national standard establishing a smoke-free surgical environment. The petition will be delivered in November 2021 during Perioperative Nurses Week.⁴

- Support the OSHA campaign and [SIGN THE PETITION HERE](#)
- Support this effort locally via the [AORN Chapter Directory](#)

Questions



AORN
SAFE SURGERY TOGETHER

Massachusetts Chap I
CHAPTER 2201

CLEARING THE AIR

Baystate Health Systems Journey to Eliminate Surgical Smoke

Sheldrick Streete, MBA, BSN, RN, NEA-BC, CNOR
System Vice President Surgical Services, Baystate Health

Cathi Dutton, MSN, RN, CNOR
Perioperative Services Educator, Baystate Medical Center



Baystate
Health

ADVANCING CARE.
ENHANCING LIVES.

Baystate Health

ADVANCING CARE. ENHANCING LIVES.

Baystate Health is nationally recognized as a leader in healthcare quality and safety. Baystate has been providing compassionate care in western Massachusetts for more than 145 years with roots dating back to the founding of Springfield City Hospital in 1873.



CARING FOR A
**POPULATION OF
MORE THAN 800K**
IN WESTERN MASS



5
HOSPITALS

NEARLY
13,000
EMPLOYEES



700⁺ EMPLOYED
PHYSICIANS
850⁺ COMMUNITY
PHYSICIANS

80
MEDICAL PRACTICES

988 LICENSED BEDS
37,000 Surgeries each year
54 Operating Rooms



BAYSTATE HEALTH MEDICAL SYSTEM



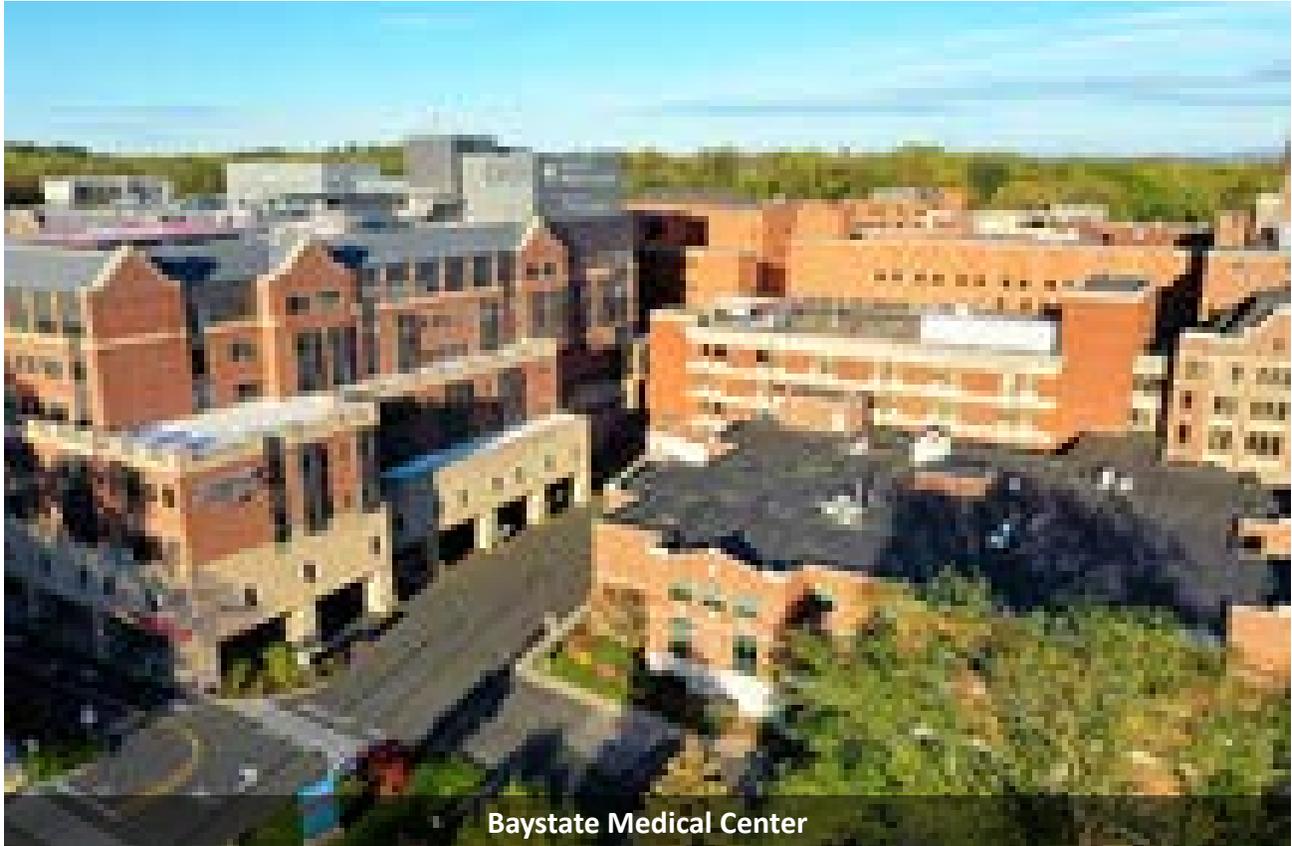
Baystate Franklin



Baystate Noble



Baystate Wing



Baystate Medical Center

THE JOURNEY BEGINS

- Staff safety initiative
- Waste Management Systems
 - 43 ORs BMC
 - 11 ORs Baystate Franklin, Noble, Wing



BMC SMOKE EVACUATORS

- Not routinely used
- Used for major plastics/reconstruction cases
- Not readily available
- Separate piece of equipment



WHY GO SMOKE FREE?

There are an estimated
500,000
healthcare workers who are exposed to laser
or electro-surgical smoke each year

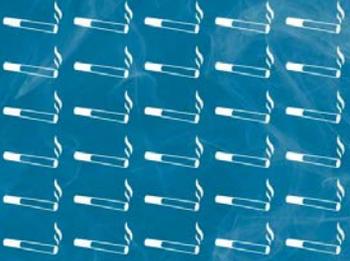


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150 chemicals and 16 EPA Priority Pollutants are found in surgical smoke.^{3,4}

27-30
unfiltered cigarettes: the average daily
impact of surgical smoke to the OR team



Sponsored by Medtronic through the AORN Foundation.
Medtronic 



DID YOU KNOW?
Using an electro-surgery
device on 1 gram of tissue =
inhaling the smoke from
6 unfiltered cigarettes
in 15 minutes.



GO CLEAR AWARD™
Surgical Smoke-Free Recognition Program



One gram of tissue.

PATH TO THE GO CLEAR AWARD

- Steps
 - Gain support from leadership
 - Assembly Team (Facility Coordinator and champions)
 - Gap analysis
 - Communication
 - Education (Vendor supported and AORN modules)
 - Audits (weekly for 3 months)
 - Apply for Award
 - Gold, Silver, and Bronze



AORN.org

OUTCOMES

- Positive
 - Surgical Services Senior Leadership support
 - Supportive OR personnel
 - Supportive Vendor
 - Equipment purchased prior to journey
- Barriers
 - Push back from some RNs and STs
 - Surgeons not all onboard
 - Device selection
- Success Story
 - Cardiac surgeon



AORN Go Clear Award™ Program



- **Baystate Medical Center**
First hospital in WMASS,
fourth in state. Only Level
One Trauma Center-**2020**
- **Baystate Franklin Medical
Center- 2022**
- **Baystate Wing- Expected
late winter 2023**
- **Baystate Noble- Expected
end of 2023**



A Surgeon's Perspective:

**John Mazzucco, MD
Holyoke Medical Center**



BEVERLY HOSPITAL: STEPS TO A SMOKE FREE OPERATING ROOM

Susan Duffy, DNP, MBA, RN

Associate Chief Nurse, Perioperative Services

Beverly Hospital

11/16/22

Beth Israel Lahey Health
Beverly Hospital



Ten Steps To A Smoke Free Operating Room

Step 1: Meet the Prerequisites

1. Commit to a smoke free environment in the OR
2. Secure leadership support
3. Assemble the implementation team
4. Access the On-line program

Step 2: Identify the Facility Coordinator & Implementation Team

1. Roles & Responsibilities of the team
2. Facility Coordinator
3. Champion
4. Team Member Characteristic

Step 3: Hold a Kickoff Meeting

1. Review the goals of the program
2. Review team members roles & responsibilities
3. Review time commitment

Step 4: Perform the Gap Analysis

1. Measure the current percentage of surgical procedures smoke is being evacuated
2. Results of the gap analysis determines the need for additional equipment

Step 5: Develop an Action Plan

1. Who will be affected?
2. What are the possible barriers and how can they be overcome?
3. How to measure program success?
4. How will you share the plan and with whom?

Step 6: Plan the Implementation of the Smoke Free Initiative

1. Develop a timeline
2. Inform the perioperative team of the benefits of the initiative, objectives, timeline and program components
3. Introduce education activities
4. Develop a policy and procedure
5. Conduct a product evaluation, if additional equipment is needed
6. Hold in-service education on new equipment and supplies

Step 7: Assign Intraprofessional Education

1. Pretest
2. Education modules
3. Post test
determines award level

Step 8: Audit and Monitor Compliance

1. Conduct an audit of smoke evacuation to determine compliance with policy
2. Audit for 3 months

Step 9: Apply for the Award

1. Submit 3 months of audits to AORN
2. Award level is based on percentage of:
 - Completion of education
 - Passing grade on post-test
 - Smoke evacuation compliance
 - Smoke evacuators

Step 10: Celebrate your success



Questions & Open Discussion