

“Waste Anesthetic Gas (WAG): What You Don’t See May Hurt You”

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What are Waste Anesthetic Gases (WAGs)?

- WAG are anesthetic gases that leak in small amounts from anesthesia breathing circuits or patients exhaling WAGS (95% unmetabolized)
- WAGs are inclusive of nitrous oxide and halothane agents
- OSHA estimates over 200,000 health care and veterinary workers exposed to WAG annually
- WAGs are reduced in the OR through: Engineering controls, workplace practices, hazardous communications and air quality surveillance programs
- None of these safety practices are in place in the PACUs where the patients are the source of WAGs

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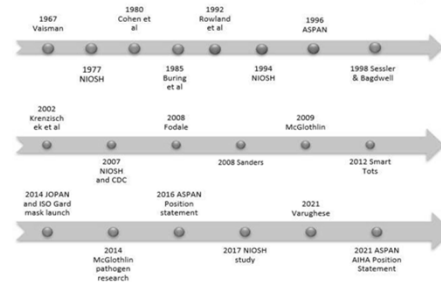
Health Implications Related to WAGs

Exposure to high concentration of waste anesthetic gases even for a short time may cause the following: Headache (Vollman, 1967; Rogers, 1986; OSHA, 1993)	Long-term exposure to low concentrations of WAG among operating room health care workers and those exposed in dental and veterinary clinics include: Miscarriages (Vollman, 1967; Cohen, 1980; Carbett, et al. 1976; Brough, 1977; Tindle, 1979; Cohen, 1980; Budge, 1984; OSHA, 1993; Sessler, 2008; Sanders, 2008)
Irritability (Vollman, 1967; Rogers, 1986; OSHA, 1993)	Congenital abnormalities (Vollman, 1967; Cohen, 1971; Cohen, 1980; OSHA, 1993)
Fatigue (Vollman, 1967; Rogers, 1986; OSHA, 1993)	Low birth weights (Tindle, 1979; Phansab, 1977)
Nausea (Vollman, 1967; Rogers, 1986; OSHA, 1993)	Exposed spouse's miscarriages and birth defects (Phansab, 1977; Budge, 1984)
Drowsiness (OSHA, 1993)	Reduced fertility (Rowland, 1992; Sessler, 1998)
Difficulties with judgement, audiovisual processing and coordination (Bruce, 1974; OSHA, 1993; McGlothlin, 1994; Sessler, 1998; Sanders, 2008)	Genetic, DNA damage (Cohen, 1980; Eats, 2014; Castillo, 2014; Rocha, 2015; Lewis, 2018)
Liver disease (Bruce, 1974; Cohen, 1980; OSHA, 1993)	Cancer (Carbett, 1976; Tindle, 1979)
Kidney disease (Bruce, 1974; Cohen, 1980; OSHA, 1993)	Bone marrow depression (Cohen, 1980; McGlothlin, 1994; Sessler, 2008)
Malignancies of the lymph or immune system (Bruce, 1968; Bruce, 1974; OSHA, 1993)	Increased homocysteine levels (Sanders, 2008)
Impaired B12 metabolic status or pernicious anemia (Banks, 1968; Ames, 1978; Sessler, 1998; Kozemko, 2003)	General health & genotoxic risks (Eckley, 2008)
	Changes in antioxidant status (Castillo, 2014; Eats, 2014; Rocha, 2015; Deng, 2018)



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Waste Anesthetic Gases (WAGs) Timeline



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WAGs in the PACU



WAGs are not metabolized but exhaled out (95% unmetabolized) into an environment that lacks any:

- Engineering controls
- Workplace practices
- Hazardous communications
- Air quality surveillance programs

Most PACU nurses are even unaware of their occupational exposure

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OSHA Provides Workers the Right to:

WORKERS RIGHTS

- A safe and healthful workplace
- Know about hazardous conditions
- Information about injuries and illnesses in your workplace
- Complain or request hazard correction from employer
- Training as provided in the OSHA standards
- Hazard exposure and medical records
- File a complaint with OSHA
- Participate in an OSHA inspection
- Be free from retaliation for exercising safety and health rights

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ASPAN Action Coalition to Address WAGs

- Inclusive of key scientist
- Partnered with AIHA
- Approached and garnered support of nine other nursing organizations

Presentations at

- Nursing Community Coalition
- Council Surgical Patient Safety
- Nurses Improving Environmental Health of Women and Children

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AIHA & ASPAN Joint Whitepaper on WAG

- Provides overview of the issues
- Summarizes the evidence
- Gives recommendations
- Provides portable information for sharing



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Ongoing Conversations with OSHA & NIOSH



- NIOSH: requesting
- Research agenda for collaborative work

OSHA Requesting

- WAGs reduction & source control
- Surveillance techniques are standardized and initiated
- OSHA recommendation with legal obligation for institutions



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ASPAN WAG Event August 2021

- Joint presentation by ASPAN, NIOSH, AIHA
- Almost 1000 participants
- Program
- o Welcome - Elizabeth Card, MSN, APRN, FNP-BC, CPAN, CCRP, FASPAN
- o AIHA and WAG research – Jim McGlothlin, PhD, MPH, CPE, FAIHA & Bruce Applegate, PhD
- o Results of NIOSH study on WAG in PACU – Alberto Garcia, MS

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ASPAN WAG Event August 2021

- Program (continued)
- o Panel Discussion
- Alberto Garcia, MS (NIOSH)
- Jessica Garibay RN & Cathy Scheer RN (Nurse Leader & Nurse Researcher)
- Glenn Lamson, CIH (OSHA)
- Ken Mead, PhD, PE (NIOSH)
- Jim McGlothlin, PhD, MPH, CPE, FAIHA (AIHA)
- o Closing Remarks – Dina Krenzischek, PhD, RN, MAS, CPAN, CFRE, FASPAN, FAAN

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Brief Summary of Concerns

- WAG and Pathogen exposure among healthcare workers in the PACU and other Clinical Units.
- Lack of using source controls of market available scavenging systems.
- Hospital hesitancy in implementing these protective systems to mitigate and prevent WAG and pathogens exposures.
- No government enforcement requiring the use of source control scavenging systems in these areas.
- Current engineering controls such as general ventilation, air exchange rates may be inadequate in protecting nurses from WAGs and Pathogens in the PACU.

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Questions for Hospitals

- How do healthcare administrators assure its healthcare workers are free from known occupational safety and health hazards, such as WAGs and Pathogens?
- What are the methods and means of monitoring occupational safety and health hazards, and when found, what is done to mitigate and prevent exposures?
- Are healthcare administrators aware of feasible and effective engineering controls correct these known hazards?

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What Should be Addressed?

- General ventilation versus source control (i.e., use of market available scavenging systems) to control and prevent WAG & pathogen exposures.
- General area sampling versus breathing zone sampling for WAGs among nurses in the PACU
- Time-Dose dependency – Real-time breathing zone data needed for the first 20 minutes the nurse engages with the patient in the PACU

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What Should Be Addressed?

- Further studies in
 - Additional health epidemiology for WAG exposure outside of the OR (PACU, ICU, etc)
 - Real time data of recommended exposure level (REL) in the breathing zones
 - Develop standards for active and passive surveillance on the health of nurses exposed to hazards in healthcare
- Retrospective and Prospective epidemiologic studies need to be conducted to determine health impacts of nurses working in the PACU.
- Surveillance techniques need to be standardized

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Where Are We Right Now?

- White Paper / Position Statement
- ASPAN, AIHA, NIOSH & OSHA Collaborative Task Force – Nov. 2021
- ASPAN ATTENDEES
 - Elizabeth Card, Linda Wilson, Connie Tablet, Terri Clifford, Jacque Crosson, Peggy McNeil & Dina Krenzischek
- NIOSH ATTENDEES
 - Ken Mead, Chief, Engineering and Physical Hazards Branch
 - Lauralynn McKernan, Director, Division of Field Studies and Engineering
 - Jennifer Topmiller, Team lead, Engineering and Physical Hazards Branch
 - Cherie Estill, Deputy Associate Director for Science, Division of Field Studies and Engineering
 - Seif Mahmoud, ORISE Fellow
 - Kevin H. Dunn, Mechanical Engineer
- AIHA ATTENDEE
 - Michelle Twilley, Certified Industrial Hygienist

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Where Are We Right Now?

- NIOSH STUDY
 - Plan for Lab-based studies: to assess potential source control options (scavenging masks or oxygen face tents) through experiments.
 - Tools: computational fluid dynamics (CFD) to model the impact of air flow and supply distribution changes on exposure potential.
 - What will this approach address?
 - The key engineering recommendations listed in the White Paper.
 - Return date for employees to the NIOSH building (and labs) has not been determined and may impact the start of experimental work but planning and preparation continues.

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Where Are We Right Now?

- ASPAN & AIHA Collaborative Study
 - TITLE: "Retrospective descriptive quantitative study on sampling methods and measurement approaches on Post Anesthesia Care Unit (PACU) WAG Exposure"
 - PURPOSE
 - Describe current engineering sampling methods and measurement approaches on WAG exposure in the post anesthesia settings.
 - DESIGN
 - Retrospective descriptive quantitative study. Data will be collected from field engineers and industrial hygienists in the acute care settings specifically the PACUs in both community and tertiary hospitals.

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Where Are We Right Now?

- DATA MEASUREMENT
 - Demographics
 - Location of WAG measurement
 - How long and frequency of testing
 - Day and time of sampling
 - Method of sampling
 - PACU supply air ventilation
 - WAG findings
 - Are findings shared with perianesthesia nurses?
 - How do nurses report their symptoms?
 - What steps has your facility taken to reduce nurses' exposure to PACU WAG?

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Where Are We Right Now?

- ASPAN Study
 - ASPAN Perianesthesia Survey on WAG Symptoms
- Purpose
 - Describe current WAG exposure symptoms in the post anesthesia care settings.
- Design
 - A multi-site descriptive study. Data will be collected from nurses in care settings that contain WAG exposure

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Contacts:

Thank you!

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Post Question #1

➤The source of waste anesthetic gases (WAGs) in the PACU is the immediate post-procedure patient that received general anesthesia and is exhaling WAGs 95% unmetabolized into the ambient air.

- TRUE
- FALSE

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Post Question # 2

➤OSHA recognizes the occupational hazard of exposure to waste anesthetic gases in the operating rooms but not in the PACUs.

- TRUE
- FALSE

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Post Question #3

➤As a perianesthesia nurse, I can ask how healthcare administrators assure its healthcare workers are free from known occupational safety and health hazards, such as WAG and pathogens.

- TRUE
- FALSE

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ANSWERS:

- QUESTION # 1: TRUE
- QUESTION # 2: TRUE
- QUESTION #3: TRUE

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