AORN Position Statement on Environmental Responsibility

POSITION STATEMENT

AORN believes:

- All health care professionals have an ethical and professional responsibility to protect patients' health through advocacy.[1-3] Because human health is affected by and is dependent on the surrounding environment, health care professionals must proactively work to incorporate best practices that mitigate negative environmental impact on the patients and communities they serve.[4-6]

- The interdisciplinary health care community serves as a steward of the environment by seeking knowledge about climate and health effects and assessing health care work environments[7] for opportunities to reduce waste,[8] conserve natural resources, and prevent exposure to hazardous materials.[9,10]

- Environmentally responsible practices in perioperative services should align with the framework of the United Nations Sustainable Development Goals (SDGs) #3 Good Health and Well-Being; #6 Clean Water and Sanitation; #7 Affordable and Clean Energy; #9 Industry, Innovation and Infrastructure; #11 Sustainable Cities and Communities; #12 Responsible Consumption and Production; and #13 Climate Action[11-13] and be consistent with action to combat climate change and its effects.

- Education for health care professionals on environmental sustainability should include
  - general knowledge about the climate crisis effects on population health, including[14,15]
    - air pollution,
    - exposure to toxins,
    - heat-related illnesses,[14,15]
    - extreme weather events,[14,15]
    - physical and mental health effects of natural disasters,[16]
    - need for reliable access to clean food and water, and
    - modification of vector-borne, zoonotic, and waterborne diseases[17];
  - disaster preparedness[14];
  - health advocacy (ie, exercising influence in health policy decision-making) [3,18-21];
  - the impact of healthcare services and interventions on the environment[22];
  - health system infrastructure resilience[23-26];
  - supply chain engagement[27];
  - financial, social, and environmental benefits of environmental best practices[28];
  - individual role in environmental responsibility efforts[10,29]; and
  - real-world examples of environmental best practices in health care services[30].

- Environmentally responsible decision-making in health care delivery should align with local, state and federal regulations and support patient safety and optimal clinical outcomes.[8]

- Sustainability should be prioritized during the design, construction, maintenance, and renovation of health care facilities (eg, hospitals, outpatient care facilities) to minimize the environmental impact of the built environment.[31]

AORN endorses the *ANA's Principles of Environmental Health for Nursing Practice with Implementation Strategies*[32] and the *International Council of Nurses Code of Ethics for Nurses,*[4] which states, "The nurse practices to sustain and protect the natural environment and is aware of its consequences on health."[4] AORN supports environmental responsibility in the perioperative setting and provides guidance for incorporation of environmentally responsible practices, where applicable, in the AORN Guidelines for Perioperative Practice.[33-36]

Environmentally Responsible Practices

Environmentally responsible practices must adhere to local, state, and federal regulations and should align with guidelines and priorities from professional organizations. Environmental best practices can be implemented in perioperative settings through perioperative team education, interdisciplinary collaboration,[37] and advocacy. Including perioperative team members in the planning and implementation of practices intended to promote environmental responsibility can increase knowledge and adherence to updated practices.[10,30]

Conserve natural resources by

- using life-cycle assessment (LCA) data when evaluating products for purchase and use[38-40];
- selecting reusable equipment or partially reusable (eg, laparoscopic scissor handle with disposable scissor tips),[41] supplies, and materials when they are equivalent in performance and safety;
- reprocessing equipment, supplies, and materials[42,43] as defined by the manufacturer's instructions for use;
- evaluating reprocessing procedures (eg, decontamination, sterilization) efficiency, and energy consumption[42-45];
- advocating for Leadership in Energy and Environmental Design (LEED) certification,[46] Green Globes certification, WELL building certification, or other green building codes during facility construction and renovation;[31]
- considering telehealth/telemedicine[47] for preoperative and preanesthesia visits when no other testing is needed, to reduce unnecessary patient travel;
- establishing diversified facility energy portfolios that prioritize renewable energy sources[42,47-49];
- utilizing energy-efficient lighting technology (eg, motion-activated fixtures, transitioning incandescent lighting to energy-efficient alternatives[39]);
- implementing procedures to power down lights,[48] equipment including sterilizers,[34] and computers when they are not in use[50];
- programming heating, ventilation, and air conditioning systems and evacuation systems to save energy when ORs are unoccupied[39,48,51]; and
- acquiring and retrofitting energy and water-efficient equipment and supplies (eg, washers, sterilizers, LED light sources).[51]

Reduce waste by

- adopting sustainable procurement policies and practices[52] by selecting reusable products, supplies, instrumentation, materials, and equipment that meet environmental criteria over other options when they are equivalent in performance[53-55];
- opening only necessary sterile supplies,[56] medical devices, medications,[39,57,58] and implants upon surgeon confirmation;
- regularly reviewing procedural packs, instrument sets, and preference cards to remove redundant or underutilized items that result in waste[57,59-62];
- avoiding supply overages by reducing supply purchases and maintaining an accurate inventory to reduce the number of expired supplies;
- avoiding supply shortages that require extra or expedited supply shipments;

- reprocessing single-use devices[63,64] according to US Food and Drug Administration (FDA) guidelines[65];
- refurbishing instruments and equipment with proactive maintenance and repairs[38];
- donating obsolete, clean, unused materials and equipment to those with a demonstrated need[66];
- recycling and exploring revenue potential[56,67] for clean, noninfectious intact material (eg, medical plastics, packaging material, paper); and
- educating personnel about waste segregation practices (ie, landfill waste, recycling, regulated medical waste).[68]

Reduce hazardous material exposure by

- participating in procurement of supplies, furnishings, and equipment that do not contain
  - mercury, lead, cadmium or heavy metal toxicants[69]; and
  - chemicals of concern,[54,70] such as
    - di[2-ethylhexyl]phthalate [DEHP] and polyvinylchloride [PVC]), which may be found in some enteral nutrition products and tubes, general urological supplies, gloves, parenteral infusion devices and sets, respiratory therapy products, and vascular catheters;
    - polychlorinated biphenyls (PCB)[69];
    - triclosan/triclocarban, which may be found in some hand soaps and sanitizers; and
    - flame retardants, per- and poly-fluorinated alkyl substances,[71] and volatile organic compounds, which may be found in furnishings and building interiors;
- selecting surgical instruments and other medical devices that can be sterilized using the least-toxic methods (eg, instruments that can be steam sterilized instead of sterilization with ethylene oxide);
- purchasing and using the least-toxic cleaning agents, sterilization and disinfection processes, and equipment[34,72];
- implementing surgical smoke evacuation (ie, plume from electrosurgical units, lasers, and powered equipment)[73];
- installing closed fluid management systems with reusable canisters that eliminate unnecessary exposure to bloodborne pathogens and chemical solidifiers and reduce regulated medical waste;
- providing education on the global warming potential (GWP) of anesthetic gases and referring anesthesia professionals to the American Society of Anesthesiologists[74] and American Association of Nurse Anesthesiology[21] recommendations for environmental practices in the perioperative environment;
- evaluating anesthesia equipment for energy efficiency, fresh gas flow alerts, and sequestration of waste anesthesia gases to prevent their release to outside air[36,39];
- complying with local, state, and federal regulations; manufacturers' instructions; and health care organization policy when disposing of pharmaceuticals[33] and infectious waste;
- using reusable batteries where approved by biomedical engineering personnel and complying with safe disposal or recycling practices for batteries[36]; and
- ensuring electronic equipment (eg, monitors) and related supplies (eg, printer ink and cartridges) are energy-efficient and managed in an environmentally responsible and regulatory-compliant manner or are recycled at end-of-life.

Rationale

Climate change has been called the "greatest global health threat"[75] and addressing climate change the "greatest global health opportunity of the 21st century."[76] The extent to which individual health care facilities produce waste varies greatly,[77] however the health care sector plays a significant role in the global climate crisis in the following ways:

- The health care industry's climate footprint represents 4.4-4.6% of global net emissions.[19]

- Of health care's global climate footprint, supply chain comprises 71%.[76]
- The US health care sector's climate footprint is equivalent to 8-10%[19,78] of US net emissions and contributes to
  - acid rain (12%),
  - smog (10%),
  - air pollutants (9%),
  - stratospheric ozone depletion (1%), and
  - carcinogenic and non-carcinogenic air toxins (1%-2%).[79]
- Perioperative practice settings
  - generate up to 70% of a facility's total waste[80-82] with single-use items comprising up to 78% of the carbon footprint of a single operative procedure,[49] and
  - consume three to six times more energy per square foot than the rest of the hospital.[63]
- One operative procedure can generate as much waste as a family of four produces in a week.[67]
- Supply costs can comprise up to 56% of the total OR budget[83] and 15% of the total hospital expenses.[84]
- Anesthesia gases comprise more than 51% of the surgical procedure carbon footprint of a facility.[63]
- The health effects of the US health care industry's greenhouse gas emissions are estimated to be equivalent to 388,000 years of healthy life lost (disability-adjusted life years [DALYs]) from pollution-related disease and malnutrition.[19]

Sustainability initiatives have been synonymous with the "3 Rs" (ie, reduce, reuse, recycle), and authors of a scoping review incorporated an additional two categories (ie, refuse, research) to further expand on the interventions perioperative teams can implement as a part of a sustainability initiative.[85] The 23 studies identified in the scoping review measured the environmental and economic impact of 28 unique quality improvement initiatives. The authors found these quality improvement initiatives improved sustainability, however variability in reporting methods and measures made quantifying the impact of the initiatives difficult. The authors called for standardized metrics (eg, greenhouse gas emissions, water consumption by volume, electricity use) to compare quality improvement initiatives across facilities.

Many multidisciplinary studies exist regarding the health effects of climate change,[26,37,86] as well as the economic and health co-benefits of mitigation, adaptation, and resilience.[29,67,87] A survey of physicians in obstetrics and gynecology found that physicians were more likely than the general public (84% versus 54%) to believe that global warming is real, that portrayal in the media of its seriousness is accurate, and that it is generated by human activities.[88] Two-thirds of the surveyed physicians believe the amount of surgical waste generated in the operating room is excessive and increasing,[88] and the majority (95%) of the physicians supported efforts to reduce waste by opting for the use of reusable surgical tools, instruments, and equipment over disposable items where clinically equivalent.[88] However, barriers to environmentally responsible practices exist and include perceived conflict of waste reduction and operational efficiency,[7,89] a lack of knowledge of appropriate waste segregation practices,[7,29,30,90] lack of leadership buy-in,[7,30,91] lack of personnel,[90] and overall resistance to change.[92,93]

It is important, however, to balance environmental impact with patient safety concerns. For example, the FDA recommends that health care organizations use duodenoscopes with disposable components or those that are fully disposable because of documented cleaning and disinfection failures that have resulted in patient harm.[94] Authors of two systematic reviews[51,57] found that minimally invasive procedures may have an increased carbon footprint compared to open procedures (ie, 22.7 kg CO2 equivalents [CO2eq] for open procedure, 29.2 kg CO2eq for laparoscopic, 40.3 kg CO2eq for robotic-assisted[57]) and cautioned that further research evaluating the benefits of minimally invasive procedures (eg, shorter hospital stay, decreased complications) against the increased environmental impact is needed.[51]

Research on LCA of materials used in the OR demonstrates that single-use devices; anesthesia gas; and heating, ventilation, and air conditioning[95] are the top emission sources in the OR. To reduce the environmental emissions of surgeries, health care providers can adopt a combination of collaborative approaches, including minimizing materials, moving away from anesthetic gases with high GWP,[96] maximizing instrument and equipment reuse,[97] and reducing energy use when operating rooms are unoccupied.[50,64] One study found cost feedback to physicians, combined with a small departmental financial incentive, was associated with significantly reduced surgical supply costs without negatively affecting patient outcomes.[28] In addition to supporting public health and well-being, adopting best environmental practices also can deliver triple bottom line returns,[98] which reduce costs,[27] optimize operational efficiency, and enhance patient and worker safety.[72]

The health care industry, whose mission is to protect and promote health, contributes to the climate crisis—the greatest health threat of the 21st century.[99] [35]Perioperative services contribute significantly to the health care climate footprint. Nurses, the largest group of health care professionals[100] and the most trusted of health care professionals,[101] have an opportunity to fulfill their ethical responsibility and help lead the way toward a healthier future for all.

Glossary

Chemicals of concern: Chemicals that are designated by the US Environmental Protection Agency (EPA) as persistent, bioaccumulative, toxic, and that are known or suspected human carcinogens. These are listed in the US EPA Toxics Release Inventory.

Environmental criteria: A set of preferred attributes, characteristics, credentials, and certifications used during the procurement process to evaluate environmental and health effects and benefits of purchased goods and services.

Environmentally preferable purchasing: Buying products or services that have a reduced negative effect on human health and the environment when compared to competing products or services that serve the same purpose.

Global warming potential (GWP): A measure of heat-trapping gases in the atmosphere up to a specific time horizon (typically 20, 100, or 500 years) relative to carbon dioxide.

Green building codes: Codes used to design buildings to be energy efficient and water conserving, have low environmental impact, and have high indoor air quality, among other requirements.

Health Advocacy: activities related to ensuring access to care, navigating the system, mobilizing resources, addressing health inequities, influencing health policy, and creating health system improvement.

Infectious waste: Broadly defined, this is waste that can spread infectious disease (eg, blood, body fluids, sharps and other potentially infectious materials). The definition may vary by state.

LEED: An acronym for Leadership in Energy and Environmental Design, which was established in 1998 by the US Green Building Council.

LEED status: A standardized rating system through which organizations can earn LEED credits and certifications to validate the design, construction, and operation of green buildings.

Life Cycle Assessment (LCA): a technique to assess the potential for environmental impacts associated with the use of a product, process, or service by

- compiling a comprehensive inventory of relevant energy and material inputs and environmental releases (ie, emissions) required for manufacturing, distribution, use, and disposal;
- evaluating the potential environmental impacts associated with identified inputs and releases with consideration for all the variables that are required for use of the product, process or service; and
- interpreting the results (ie, comparing to other products, processes, services) to inform decision-making about environmentally preferrable purchasing.

Sustainability: Business operations that meet the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable procurement: Supply management practices that include purchase and selection of environmentally friendly products, equipment, and devices. Terminology may vary by region. Synonyms: preferable purchasing, environmentally preferable purchasing.

Triple bottom line: An accounting framework whereby companies commit to focus on social and environmental measures in addition to financial measures. The conceptual framework is comprised of three bottom lines: people, planet, profit.

Waste stream: The flow of discarded materials and fluids that eventually return to the land, water system, or air through sewer, landfill, or incineration.

Zoonotic: Infectious diseases that are spread between animals and people.

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Editor's note: *AORN has taken a stance on environmental issues for more than 30 years. The format of the documents has changed since the original position statement was approved by the Board of Directors in September 1990. In October of 1993, the position statement was revised into a recommended practices document. In March of 2006, the content from the recommended practices document was revised into a guidance statement as well as a position statement. In 2012, the content from the guidance statement was revised and consolidated into the position statement and added to online content at http://www.aorn.org.*

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