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On the Path to Net Zero: Member Sustainability Success Stories

THIS SESSION IS OPEN TO SUPPLIERS

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CE Deadline: 09/30/25



Moderator & Panelists



Moderator

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Panelist

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St. Luke's
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Disclosures



The presenters have no real or perceived conflicts of interest related to this presentation

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Learning Objectives



At the end of this session, participants should be able to:

- Recognize strategies for reducing waste, improving energy efficiency and/or reducing greenhouse gas emissions in the healthcare setting.
- Recall steps organizations can take to retire desflurane and decommission nitrous oxide medical gas pipes to reduce carbon emissions.
- Identify opportunities to reduce waste and expand recycling programs within the Operating Room and other key areas.



Poll Question #1

What sustainability projects is your organization working on? (select all that apply)

- A. Single Use Device Reprocessing
- B. Reducing Use of Sterilization Blue Wrap
- C. Kit Reformulation
- D. Desflurane Retirement
- E. Decommissioning Piped Nitrous Oxide
- F. Other

REDUCING WASTE BOOSTING VALUE



OR diversion strategies that deliver
Avery Palardy, Beth Israel Lahey Health

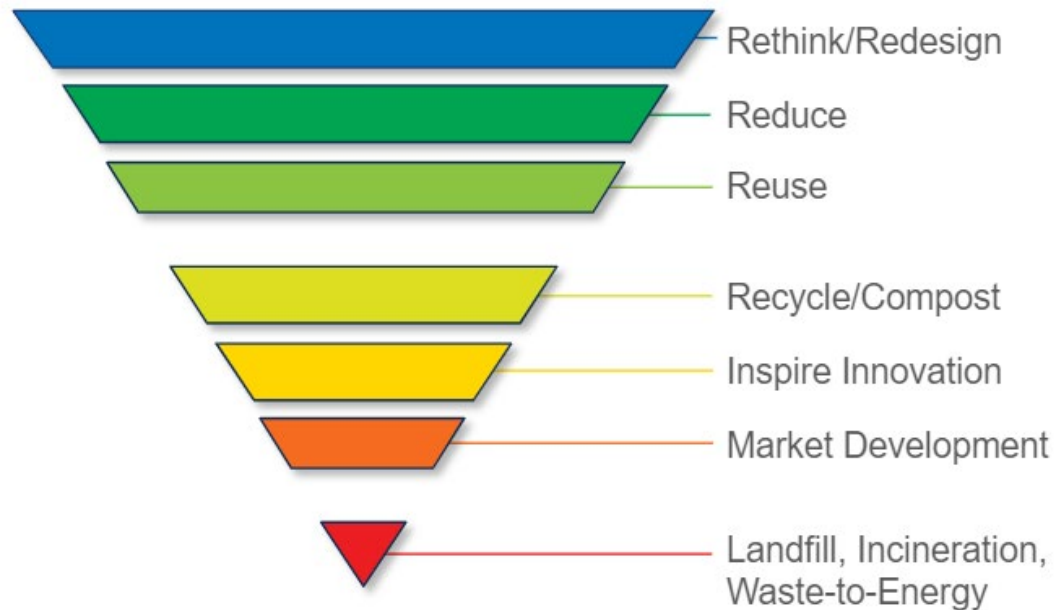


Zero Waste* by 2030 @ BIDMC



BIDMC's Zero Waste Hierarchy

A framework to reduce environmental harm, prevent unnecessary exposures to toxins, and avoid costly disposal



Opportunities in the OR that are financially and environmentally strategic:

- *Reprocessed Single-use Devices*: Lower emissions and costs, reduce waste, improve supply resilience
- *Kit Reformulations*: Eliminate excess, reduce reprocessing and conserve resources
- *Reusable Sterilization Containers*: Reduce disposable plastic, streamline workflows and improve processing efficiency
- *Zero Waste Education*: Build compliance culture and reduce regulatory and contamination risks

**Defined as over 80% of non-hazardous solid waste diverted from landfill or incineration through reduction, reuse, recycling, compost or use of future technologies*

Reprocessed Single-use Devices (SUDs)



What are Reprocessed SUDs?

- Certain devices can be safely reprocessed and reused via a third-party FDA approved vendor
- Reprocessing restores full functionality, reduces environmental burden and supports cost-effective care

Where are there opportunities?

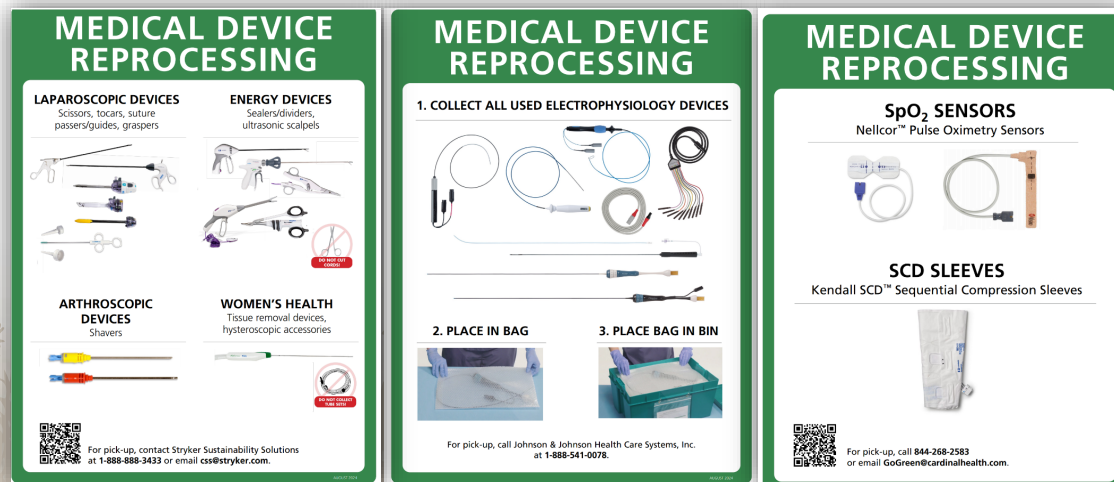
OR, EP/Cath Labs, Inpatient

What needs to be considered?

- Requires clinician buy-in
- Contractual review for procurement restrictions
- Consistent collection processes

Why procure reprocessed SUDs?

- Cuts supply chain emissions and waste
- Saves millions in purchasing costs
- Reduces resource intensive manufacturing
- Increases supply chain resiliency

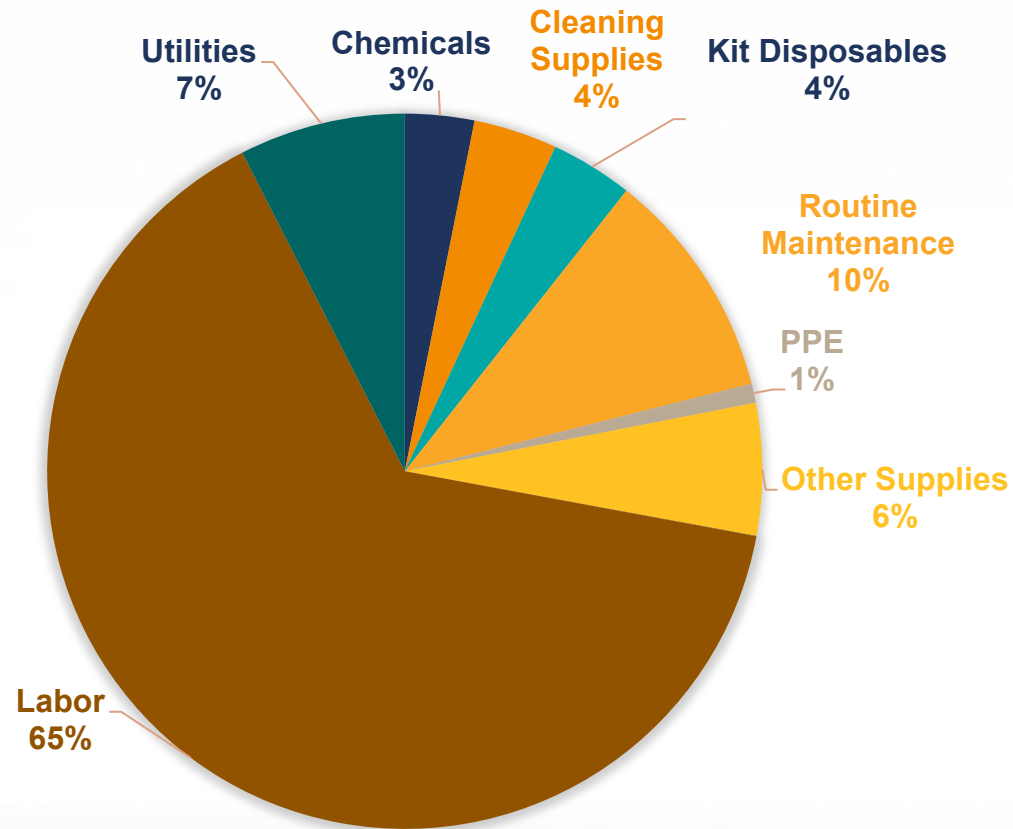


2024 Impact @ BIDMC

- \$2.7M saved
- 1,434 MTCO2e avoided
- 4,100 lbs of waste diverted

Image Source: BIDMC Custom Waste Signage

Kit Reformulation – L&D Case Study



TOTAL ANNUAL SPEND TO REPROCESS A KIT

- A physician-led effort to optimize the L&D vaginal delivery kit—BIDMC’s most reprocessed kit—identified unneeded items and built consensus on a streamlined version.
- Majority of equipment goes through cleaning and decontamination; assembly and packaging; sterilization; storage and distribution.
- Reductions within existing kits translate directly to supply chain, labor and utility savings.

Projected Results

- 36% reduction in existing kit
- 25,576 less items to reprocess
- \$60,600 in savings for central sterile
- 80,000+ gallons of water reduced

Reusable Sterilization Containers



Why Reusable Sterilization Containers?

- *Boosts Efficiency:* Saves staff time and speeds up processing
- *Better Protection:* Prevents punctures and tears
- *Cuts Costs:* Reduces need for blue wrap, tape and filters
- *Stable supply:* Ensures consistent inventory
- *Saves space:* Stackable for better storage



Progress to Date:

- 89% of kits converted
- Still generating 20+ tons of blue wrap waste ($\approx$ a 6-story building)
- Diversion opportunity 0.3% increase

Next Steps:

- Calculate payback to convert the remaining top 25 reprocessed kits
- Launch a recycling program for leftover materials

Culture Shift: Education and Infrastructure



- **Unified Signage and Training:** Rolled out across roles and departments
- **Clear Education:** Drives compliance and supports reprocessing, recycling and diversion efforts
- **Effective Materials Management:**
 - Supports zero waste goal
 - Ensures regulatory compliance
 - Reduces safety and environmental risks
 - Delivers financial benefits across programs

2024 Results

- \$4.4M in total waste-related savings
- 58.6% waste diversion
- Decreased 25 tons of regulated medical waste
- 102 tons of paper reduced

Culture Shift: Education and Infrastructure



SHARPS CONTAINER
SINGLE-USE INSTRUMENT MANAGEMENT
All needles, IV catheters, syringes with sharps attached or embedded, and sharp medical instruments (e.g. scalpel blades, suture needles, disposable razors)
All broken medical glass (e.g., pipettes, glass vials, microscopic slides)
Open larger items to safely drop into sharps container.

MEDICAL SUPPLY DONATIONS
UNSOILED, UNPACKAGED OR EXPIRED
Common donation items:
• Alcohol wipes and swabs
• Expired supply room supplies
• Medical tape and opened gauze
• Partially used ointment
• Scissors and syringes (protect sharp edges)
• Socks
• Toiletries
DO NOT DONATE:
• Chemicals
• Expired IV fluids
• Medications
• Test tubes
All supplies from Code 1 and Code 2 isolation and Contact Plus Precautions should be thrown away.
Reference Guide PG.E33
Donations should be boxed up, sealed and documented with the appropriate label.

TRACE CHEMOTHERAPY
EMPTY AND/OR FULLY ADMINISTERED CHEMOTHERAPY:
• Vials, syringes, needles, sets, wipe, IV bags
• Cardboard packages
• PPE (i.e., gloves, gown, mask, etc.)
• ChemoClave® pieces
• Transport bags
• Spill clean-up materials

HAZARDOUS WASTE SATELLITE ACCUMULATION AREA
AEROSOLS
Dispose in white aerosol collection bin:
• All inhalers used as a propellant, such as HFA
• Other pressurized aerosol containers
Please collect the following inhaled medications due to explosive and/or flammable nature:
• Albuterol sulfate
• Budesonide/formoterol
• Fluticasone propionate
• Salmeterol
• Beclomethasone
• Salmeterol/bromide
Dispose in trash: Driks®, Handihaler™ and other powder inhalers

ZERO WASTE AT BIDMC
OPERATING ROOM WASTE DISPOSAL CHART
ENVIRONMENTAL SERVICES
617-975-9700
servicesresponsecenter@bidmc.harvard.edu
MIXED RECYCLING
Empty and visibly clean:
• Metal cans
• Glass bottles
• Paper products: newspaper, paper bags, magazines
• Boxes: cardboard, paperboard
• Plastic bottles, tubs, pails: Containers with green bags or green bags utilized pre-case for collection
• Jugs, cups and lids
GENERAL TRASH
• Syringes without a needle
• Paper towels
• Blue wrap
• Intuitive Robotics instruments (wrap in drape)
• Dropper
• Soft plastics (e.g. packaging)
SOILED LINEN AND REUSABLE YELLOW GOWNS
• All soiled linen and yellow reusable gowns must be placed in the "blue bag" hamper, no matter the state
• NEVER throw away reusable gowns or linen
• Place broken or torn linen in the provided bag on the linen cart
SHARPS
• Needles
• Ampoules
• Broken glass vials
• Syringes with needles
• Sets with spike (non-chemo)
• Blood products (albumin, etc.)
• All other sharps
CONTROLLED SUBSTANCES
• IVs: Drain the liquid from the IV bag into container
• Syringes: Expunge contents into container and place empty syringe into sharps container
• Vials and ampoules: Draw out remaining contents and expunge into container
• Dispose of vials in trash. Place ampoules in sharps container
• Patches: Drop through the vertical slot
• Pills, tablets and capsules: Drop through middle hole
TRACE CHEMOTHERAPY
Common locations: Stocked in clean supply room
Empty and/or fully administered chemotherapy:
• Vials, syringes, needles, sets, wipe, IV bags
• Cardboard packages
• PPE (i.e., gloves, gown, mask, etc.)
• ChemoClave® pieces
• Transport bags
• Spill clean-up materials
BIOHAZARDOUS BOX (RED BAG)
• Blood saturated materials
• Blood and blood product in bulk and free draining, liquid state should be solidified or poured down soil utility sinks
• Pathological waste
• Cultures and stock of infectious agents and associated biologicals
• Infectious animal waste
ENVIRONMENTAL HEALTH & SAFETY
617-632-0614
ehs@bidmc.harvard.edu
BATTERIES
Common locations: Nurses' stations
• All batteries are accepted
• All terminals of lithium and lead acid batteries must be taped (scotch tape is OK) before placing in the container
PHARMACEUTICAL WASTE BLACK BIN
Common locations: Upon request
• Full or partially administered chemotherapy containers
• Any full or partially full medications, IV bags, or other pharmaceutical products used during patient care
• NO BIOHAZARD BAGS OR MATERIAL
REPROCESSING
• Certain single-use devices in the ORs can be collected to be made like new
• Refer to the signage on or above the bin for what can be collected and who to contact for a pick-up. In general, single-use Stryker laparoscopic, energy, arthroscopic and women's health devices can be collected
REFER TO THE SIGN ON OR ABOVE THE COLLECTION BIN FOR CONTACT INFORMATION.
MEDICAL SUPPLY DONATIONS
Common locations: Clean Core
• Unused surgical medical supplies should be placed in central collection
• Supplies will be donated to overseas medical missions

COMPOST
FOOD SCRAPS
• Fruit and vegetables
• Meat
• Cheese
• Grains
PAPER PRODUCTS
• Napkins
• Paper plates
• Paper towels
• Paper trays

MEDICAL DEVICE REPROCESSING
PREVALON® MATS
Roll and fold
TOURNIQUET CUFFS
For pick-up, contact Stryker Sustainability Solutions at 1-800-888-3433 or email cs@stryker.com

TRASH
ALL OTHER ITEMS, ESPECIALLY:
• Coffee cups and lids
• Chip bags
• Condiment cups and lids
• Deli and salad containers
• Disposable utensils
• Plastic bags and wrap
• Straws and stirrers
• Styrofoam

REGULATED MEDICAL AND BIOLOGICAL WASTE
CONTAMINATED ITEMS THAT GO IN THE BIOHAZARDOUS BOX
• Cultures and stocks of infectious agents and associated biologicals
• Any disposable serological pipettes
• Solidified free draining, liquid state blood and fluids
• Blood saturated materials and pathological waste
For pick-up, contact Environmental Services at servicesresponsecenter@bidmc.harvard.edu. If located on CUS, please call Environmental Services at 617-632-7043 or Pager ID #99008.

Image Source: BIDMC Custom Waste Signage

Takeaways for Your Hospital / Health System



- **Quick Wins:**

- Purchase and collect SUDs for immediate savings and emissions reductions
- Standardize signage and proper materials management education for compliance and program optimization

- **Mid-term Opportunities:**

- Convert to reusable containers to improve efficiency, cut costs and reduce waste
- Partner with clinicians to optimize surgical kits

- **Region Dependent:**

- Implement recycling for blue wrap, if downstream market exists and financially viable



Poll Question #2

Does your facility currently use Desflurane?

- A. Yes, and we are evaluating our ability to eliminate use
- B. Yes, and we are not planning to eliminate use
- C. Yes, but we have minimal usage of desflurane
- D. No, we have completely eliminated the use of desflurane

DRIVING EMISSIONS OUT OF THE OPERATING ROOM



How and why HCA Healthcare chose to eliminate desflurane from operations

Zoë Beck, HCA Healthcare



Why retire Desflurane?



Four reasons to retire DES include:



Lack of Clinical
Superiority



4x Cost Over
Sevoflurane¹



20x Negative
Environmental
Impact²



Opportunity
to Lead

¹: HCA Healthcare purchasing data

²: IPCC AR5 conversion numbers

Lack of Clinical Superiority



Desflurane **lacks clinical superiority** to Sevoflurane and in fact, **may be more harmful** to some patients.



Bariatric

Literature has shown that, with titration dosing, morbidly obese patients receiving Sevoflurane can be extubated within a **clinically similar** timeframe as patients receiving Desflurane, within 1–2 minutes.



Airway Irritation

Desflurane has a pungent odor and is commonly associated with airway irritation, with approximately **30–40% of patients developing coughing**, breath holding, excessive salivation, or laryngospasm.



Excessive Vasodilation

Desflurane exerts more potent vasodilatory properties and **lowers blood pressure** by a magnitude potentially associated with harm.

Source: HealthTrust Performance Group. (n.d). Anesthesia Gas - Clinical Summary.
<https://members.healthtrustpg.com/resources/pharmacy/resources/anesthesia-gases>

Cost Efficiency



Sevoflurane is approximately 4x cheaper than Desflurane

Cost savings greater than
\$1M in year one of desflurane
elimination initiative
throughout the enterprise.



Source: HCA Healthcare purchasing data

Environmental Impact



Replacing Desflurane with Sevoflurane **reduces anesthetic gas carbon footprint by ~95%**

The gases emitted per MAC-hour (“Minimum Alveolar Concentration”) by Sevoflurane are the CO₂ equivalent of driving a car **4 miles** – compared to Desflurane, which emits an amount of gas equivalent to driving from San Antonio to Houston, nearly **200 miles** away.



Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Image source: HCA Healthcare Mountain Division

Opportunity to Lead



Our hospitals are the **first in Idaho and Utah** to retire Desflurane, and Mountain division was the **first HCA Healthcare division** to make the change.

“It is rare when a single clinical behavior can reduce either cost OR environmental harm. Avoiding Desflurane will do both.”

Source: Anesthesia and Analgesia. October 2020, Volume 131, Issue 4, pp. 1317-1322

Road to Success



Identify project
champion/leader

Assemble and
educate core
team*

Pick a pilot
location to
demonstrate
process and
success

Create a toolkit
to guide other
facilities through
the process

Negotiate with
suppliers to
eliminate
desflurane and
vaporizers

Formalize
process through
communication
tailored to
audience

***Core team could include: anesthesiologists, pharmacy, supply chain, sustainability leaders**

WASTE ANESTHETIC GAS



Nitrous oxide pilot and next steps

Stephanie Wicks, St. Luke's Health System



Poll Question #3



Has your facility decommissioned your nitrous oxide medical gas pipes?

- A. Yes
- B. No
- C. I don't know

Background: Why Reduce Nitrous Oxide?



Reduce Scope 1 Emissions

- Industry recommends transitioning to e-cylinders due to leaks of Nitrous from piped systems¹
- Nitrous gas has a global warming potential (GWP) 273 times that of CO₂



Reduce Costs

- It was found using e-cylinders decreased costs, during operations and construction
- System standardization to increase efficiency



Empower Clinical Leadership

- Anesthesiology leadership was a key driver of this initiative
- Contribute to climate emissions reductions through clinical work - "making a difference"

Background: Nitrous Pilot Highlights



Analyzed current use of
Nitrous Oxide (baseline 2022–2023)

- Pilot was conducted at 1 of the 5 hospitals in the system
- Acute care hospital with 430 licensed beds

Designed Pilot

- Nitrous supplied via portable cylinders vs piped supply
- Worked with clinical teams on processes to store, monitor and use e-cylinders

Implemented Pilot

- Utilized e-cylinders for all clinical cases (**July 2023-July 2024**)
- g-cylinders required to maintain pressure in piped infrastructure

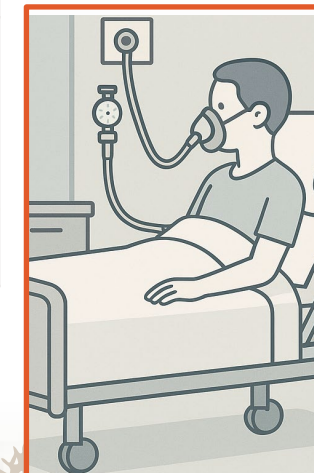
**Analyzed Pilot data/
Recommended
next steps**

- Review nitrous utilization compared to baseline
- Calculate cost and emission changes
- The successful pilot underscores the feasibility and benefits of the approach
- Broader implementation across our healthcare system is recommended

Results: Nitrous Pilot Data



		Quantity	Cost	#	MTCO2e	
Baseline (2022-2023)	g-cylinders	42	\$11,542	2352	318	
	e-cylinders	59	\$2,388	661	89	
	Total		\$13,930	3013	407	
Pilot (2023-2024)	g-cylinders	30	\$8,245	1680	227	100% Non-clinical delivery
	e-cylinders	182	\$7,366	1525	206	



**G-CYLINDER
(piped)**



E-CYLINDER

Learning:

1. Approximate 50% of nitrous is not delivered to a patient
2. Savings of emissions and costs are also ~50%

Image Source: 'Graphic of nitrous piping in a hospital vs. E-cylinder in the patient room' prompt, Microsoft Copilot, June 12, 2025

Next Steps



		Quantity	Cost	#	MTCO2e*	
Baseline	g-cylinders	42	\$11,542	2352	318	
	e-cylinders	59	\$2,388	661	89	
	Total		\$13,930	3013	407	
Pilot	g-cylinders	30	\$8,245	1680	227	100% Non-clinical delivery
	e-cylinders	182	\$7,366	1525	206	
Go Forward	e-cylinders (only)	182	\$7,366	1525	206	

Next Steps :

1. Savings ~\$8,000 per year and 227 Metric Tons Carbon Dioxide equivalent (MTCO2e*) (~650,000 miles in an average car)!
2. Decommission piped nitrous ~\$13,000. ROI ~2 years
3. Standardize care – implement across health system

Nitrous Next Steps: Expansion of Program



- ☒ Hospital #1 (pilot) – Clinical teams have completed transition to e-cylinders
- ☐ Hospital #2 – L&D already using e-cylinders, convert rest of clinical area w/ piped nitrous
- ☐ Hospital #3/4 & Community Hospital #4 – Nitrous inventory completed

NOTE: Planned expansion of main Hospital #1 – \$300k savings when piped nitrous removed from design documents



Assessment Question #1



Based on the presentation, which of the following was identified as a strategy to reduce greenhouse gas emissions in the healthcare setting?

- A. Reduce the use of Desflurane
- B. Utilize e-cylinders for Nitrous Oxide
- C. Expand Reprocessed Single-Use Device Programs
- D. All of the above

Assessment Question #1: Correct Response



Based on the presentation, which of the following was identified as a strategy to reduce greenhouse gas emissions in the healthcare setting?

- A. Reduce the use of Desflurane
- B. Utilize e-cylinders for Nitrous Oxide
- C. Expand Reprocessed Single-Use Device Programs
- D. All of the above

Assessment Question #2



Steps for retiring desflurane and decommissioning nitrous oxide gas pipes include which of the following?

- A. Identify Project Champion/Leader
- B. Pick a pilot location to demonstrate process and success
- C. Key stakeholder education
- D. All of the Above

Assessment Question #2: Correct Response



Steps for retiring desflurane and decommissioning nitrous oxide gas pipes include which of the following?

- A. Identify Project Champion/Leader
- B. Pick a Pilot location to demonstrate process and success
- C. Key stakeholder education
- D. All of the Above

Assessment Question #3



True or false. Recycling sterilization wrap in the operating room is one strategy to reduce waste and expand recycling within a healthcare organization.

- A. True
- B. False

Assessment Question #3: Correct Response



True or false. Recycling sterilization wrap in the operating room is one strategy to reduce waste and expand recycling within a healthcare organization.

- A. **True**
- B. False

Panelists:

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HCA Healthcare

Avery Palardy

Beth Israel Lahey Health

Stephanie Wicks

St. Luke's Health System



Moderated by:

Jennifer Westendorf

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PANEL DISCUSSION

References



1. Braschi, C., Tung, C., and Chen, K. (2022). The impact of waste reduction in general surgery operating rooms. *The American Journal of Surgery*, 224 (6), 1370 - 1373.
<https://doi.org/10.1016/j.amjsurg.2022.10.033>
2. Wyssusek, K., Chan, K.L., Eames, G., and Whately, Y. (2022). Greenhouse gas reduction in anaesthesia practice: a departmental environmental strategy. *British Medical Journal*, 11, 1-7. <https://doi:10.1136/bmj-2022-001867>
3. Sherman, J. (2024). It's time to abandon Nitrous Oxide Pipes. *ASA Monitor*, 88(33).
<https://doi.org/10.1097/01.ASM.0001006828.24359.cd>



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Thanks y'all!



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