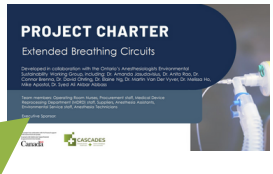
CASCADES

SUSTAINABLE PERIOPERATIVE CARE

Project Charter Summary

SUBSTITUTE REUSABLE ALTERNATIVES

Extended Breathing Circuits



PROJECT CHARTER: See the full version of the project charter for more change ideas, details, and a complete list of references.

Anesthetic breathing circuits are an essential component of airway management, yet disposable circuits are a major source of plastic waste. Often, circuits are removed at the end of each day for disposal or decontamination; however, circuit use can be extended to seven days (with a unique filter for each patient), with no observed increase in bacterial contamination.

Many centers have adopted reusable breathing circuits as a more sustainable alternative, although sterilization of these devices more frequently than necessary is still a waste of electricity and water. Reusable circuits can be used for approximately 12 months, and a life cycle assessment has found that in countries with renewable electricity generation (e.g., Canada), this can lead to a >80% reduction in emissions associated with circuits.

Both extending the use of disposable circuits and adopting reusable circuits also mean that fewer need to be purchased, resulting in cost savings and increased resilience against supply chain shortages.

GOAL: Reduce waste associated with breathing circuits by: (1) extending the use of disposables to 7 days; (2) switching to reusables; and/or (3) extending the time between washes of reusable circuits to 7 days

PROJECT SCOPE: Extend use of all breathing circuits and replace disposable with reusable circuits amongst all anesthesia delivery units (prioritizing operating rooms, where the majority of breathing circuits are used)

EMISSIONS SCOPE: Scope 3 (emissions arise from activities or products related to health sector activities, but not owned or controlled by your organization)

ESTIMATING IMPACT

ACTIVITY/OUTCOME METRIC		RELATED ENVIRONMENTAL METRIC		ENVIRONMENTAL IMPACT
Number of reusable breathing circuits used per month	×	4.68 kWh electricity and 78.14 L water	=	Estimation of total impact in kWh and L of water.
• Source from procurement data, the medical device reprocessing department, or a self-audit. • Monthly counts are recommended to observe progress, but data can be processed for any given time frame.		• There are no existing figures to calculate GHG emission associated with disposable or reusable circuits, but these figures allow for an estimate of thee electricity and water savings associated with extending the use of reusable circuits to seven days. • These metrics are calculated based on data reported in a 2014 study in Australia, and may be imprecise estimates for Canadian contexts.		• There should be a reduction in this number over time, reflecting energy and water saved by extending the period between circuit sterilizations. • Calculations will yield estimates only.

Project Charter developed in collaboration with the Ontario's Anesthesiologists Environmental Sustainability Working Group.
Charter summary developed by Dr. Connor Brenna.

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Root Causes and Change Ideas for Extended Breathing Circuits

PLAYBOOK: View the playbook for other perioperative sustainability opportunities and resources.

VIDEO: Breathing Circuits with Dr. Melissa Ho

VIDEO: The Reprocessing Pathway at NYGH

EDUCATION & AWARENESS

Institutions using disposable breathing circuits (especially for less than 7 days) may lack awareness about the amount and environmental impacts of plastic waste, the safety of extending circuit use, or the fact that "single use" is a manufacturer claim not rooted in evidence. Centers with reusable circuits may not be aware that it is safe to extend the use of these circuits between washes.

- Produce an educational campaign that demonstrates the benefits and safety of extended use and reusable circuits, and aids in the recognition of circuits specifically designated by manufacturers for seven days or more of use.

CLINICAL WORKFLOW

It takes more effort to develop a clear process for changing extended-use circuits to ensure that they are not forgotten. Centers with a mix of disposable and reusable circuits may see reusable circuits inadvertently thrown out.

- For disposal circuits: develop a robust process to indicate when circuits should be changed (e.g., on a given day of the week, and after anesthesia for patients with respiratory infections or precautions).
- For reusable circuits: develop a system to facilitate the routine exchange of circuits for cleaning.
  - Ensure the involvement of MDRD, anesthesia assistants, and OR staff to integrate procedures like changing filters and face masks, cleaning the external surface of breathing circuits, and exchanging reusable circuits when necessary.
- If needed, transition using a hybrid model during a short training period (i.e., 3 months) during which both varieties of circuit are available.

FINANCES & PROCUREMENT

Upfront costs of reusable circuits are more expensive than single-use costs, although per use costs are much lower over time. Hospitals may have existing contracts with "single-use" vendors.

- Create a business case to show that the cost savings of purchasing breathing circuits for seven-day use is significant compared to single-use.
  - If a disposable circuit is used for an extended period (while keeping the same supplier), there is no additional initial cost.
  - If switching to a product where the manufacturer attest to the safety of extended use, the cost per circuit will be higher, but the total cost will still be reduced.
- Contact the current supplier of the hospital's breathing circuits to determine how long use can be extended for; most circuits can be extended for seven days even without attestation, with appropriate precautions.

INFRASTRUCTURE

It requires coordination with the Medical Device Reprocessing Department to ensure that the appropriate infrastructure is in place for cleaning, drying, and storing reusable circuits. This reprocessing equipment may already be available, but specific holders are often required to hold circuit components for cleaning and drying.

- Ensure that supply volume accounts for enough circuits to be in active clinical use as well as those in the cleaning and drying process.
- Ensure that there is an anesthesia/respiratory rack that can be used in your center's washer/disinfector in MDRD.
  - An example is shown here of the model used in Collingwood General and Marine Hospital (CGMH) in Ontario.

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