GREENING HEALTH CARE
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Anesthetic Gas Recovery from Hospital Operating Rooms (ORs)

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Abstract

Anesthetic gases used in surgical procedures are highly potent greenhouse gases and generally exhausted to atmosphere. Technology exists which can capture and contain these gases, avoiding their damaging effect on the environment. Ongoing development is expected to make some recovered drugs available for reprocessing and use by hospitals before the end of 2021. Hospitals are encouraged to consider this technology in the design of new facilities and when renovating existing OR ventilation systems.

Background

Anesthetic gases used in surgical procedures are reported to have several thousand times the impact as greenhouse gases than CO_2, with desflurane being the most potent. A typical OR is estimated to produce around 110 tonnes of CO_2 equivalent emissions per annum due to anesthetics, depending on the mix of gases in use. Relatively new technology, available from two different companies and in use at a growing number of hospitals, recovers and contains these gases thereby keeping them out of the atmosphere. Anesthetic gases are very expensive (in the order of $600/litre costing $10,000-$15,000/year per OR). Work is in progress by which recovered gases can be reprocessed and used by participating hospitals, thereby lowering operating costs.

Nitrous oxide (N_2O) is also an important greenhouse gas, with 200-300 times the potency of CO_2, and is used in far greater volumes than other anesthetic gases. Equivalent technology does not exist for recovering N_2O emissions. Good management practices are needed in selection and use of all anesthetic gases to mitigate both their high cost and environmental impact.

Applications

Decentralized units attach to the back of the anesthetic gas machine in each OR. Centralized units recover the gases from the scavenging system serving all the ORs. The units are reported to be 100% efficient in adsorbing the gases which pass through them. However, overall recovery efficiency is lower since about 5% of total use is absorbed by the patient, with 5% more breathed out in the recovery room. Losses due to scavenging system leakage vary but are believed to be small. Canisters containing the recovered liquid are collected by the supplier to be extracted and liquified for further processing until new use applications are in effect.

Stanford Children Health – central halogenated drug recovery unit (Class 1)

The economic case for implementing anesthetic gas recovery is site specific and hospitals are encouraged to obtain proposals for their sites. The economics depend substantially on future greenhouse gas emissions charges or offset prices. Costs can be a combination of up-front installation and monthly service charges. Costs

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are lower when the system is designed into a new hospital or an OR renovation project. Future use of recovered gases is expected to offset these costs.

Moving the Yardsticks

Greening Health Care sees this technology as a positive addition to the toolbox for significantly reducing greenhouse gas emissions from hospitals.

We will be working with member hospitals, governments and industry to advance awareness and knowledge in support of decision-making which is both economically and environmentally positive, and will report back periodically as the story unfolds.

The themes guiding this ongoing engagement are:

- Working with hospitals to:
  - consider anesthetic gas recovery in new facility design development and major OR renovations
  - compile data on total anesthetic gas use and overall recovery efficiency
  - share management practices which can avoid unnecessary use of all types of anesthetic gases
- Working with governments to consider anesthetic gas reduction and recovery as an element of greenhouse gas mitigation strategy

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