Capturing Greenhouse Inhalation Anesthetics for Better City Atmosphere

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**My opinion**

Exquisite phenomena related to inhalational anesthetics exposure had warranted the development of scavenging systems decades ago for clearing and maintaining the operating room air quality to avoid the health concerns for operating room personnel. However, there had been growing concerns [1-2] in relation to venting these untreated scavenged anesthetics out of the protected operating room to the innocent city atmosphere and subsequent potential (yet not completely studied) direct risks to city population’s health (dependent on the geometrically progressing incidences of the anesthetics-based medical procedures and subsequently increased but yet not quantified anesthetics concentrations in the city atmosphere) similar to occupational hazards of inhalational anesthetics [3-7] as well as indirect global climate changes secondary to greenhouse effects of these vented gases [1-2]. The only limitation to counter this known menace was the lag in evolving technology to capture and not helplessly venting these gases into city atmosphere.

Global warming debate is not new to the scientific community [8]. However, the venting of the “waste” inhalational anesthetic agents namely isoflurane, desflurane and sevoflurane into the city environment have recently been gaining limelight secondary to the development of technologies [9-10] that trap these anesthetic agents and then “recycled” as raw materials for the production of the “future” use inhalational anesthetic agents namely isoflurane, desflurane and sevoflurane. Though these agents had been “exempted” under the “medical necessity” [2] clauses of the social norms in the evolving social concerns related to global warming, the most obvious reason was the helplessness of the anesthesia providers’ community in relation to the non-existence of the “trap and recycle” technology for these global warming gases until recently. The extent of the problem is enormous [1-2]. In simple terms, the operating rooms use scavenging systems that collect the exhaled inhalational anesthetic gases and then passively or actively vent them out into the city atmosphere. Usually, more than 95% of inhalational anesthetic gases used in the operating rooms are vented out unchanged into the city atmosphere because there was no possible technology to trap these vented gases; and the concentrations accumulated within the enclosed environments of the operating rooms have been far more and quantifiable in terms of occupational exposure to the operating room personnel as compared to poorly quantifiable exposure to the city population due to the dilution of the city atmosphere. This has changed now that we have the technologies to deal with ‘innocent’ 95% vented inhalational anesthetics that the health concerns secondary to these vented gases have been rejuvenated. The potential to cause health harms has only been studied in the operating room personnel until now and hence the scavenging systems were developed decades ago to keep operating room cleaner; however now is the time to re-focus on keeping the city clean too with the capturing and recycling of the potent inhalational anesthetic gases. These gases are about 7 times heavier than air and tending to stay in our breathing zones and with still unquantified exposure risks to the city personnel except for the known quantified global warming and greenhouse effect with a warming impact up to 3,766 times greater than CO2. Even though the Environmental Protection (EPA) Act that formulizes regulations aimed at preventing pollution and protecting the environment and human health has recognized the isoflurane, desflurane and sevoflurane as the potential pollutants, however, EPA has still to catch up to endorse these innovative technologies that will be easy, viable and valid answer to the specific pollutants called scavenged inhalational anesthetic gases. To put up the anesthetics potential for global warming, it can be said that one average sized hospital annual anesthetic emissions are equivalent to pollution caused by 400 cars [1-2] and the answer to this major pollution is either planting approximately 125,000 trees per year, or using the Deltasorb® Anesthetic Collection Service or Anesthetic Gas Reclamation, LLC. Moreover, the rate at which anesthetics are being administered secondary to geometric progression of surgical interventions and understandable patients’ fears of awareness and pain, the emissions will go up and beyond.

In regards to resources issues, presently, one of these
innovative technologies is being supported (morally, politically and financially) by the various eco-friendly organizations; the total cost incurred by the provider is 10 USD per operating room per day according to the website [1]. Moreover, the technologies will be self-supporting as far as finances are concerned as the long term goal of these technologies is not only to generate funds from the universalization of the application of these technologies in all operating rooms but also to sell the recycled inhalational anesthetics.

Ethically, though these newly developed technologies will only trap isoflurane, desflurane and sevoflurane, and will not have no role at all in the trapping of nitrous oxide (the only other remaining inhalational anesthetic gas as far as United States is concerned), the nitrous oxide is only being used by clinical preference rather than the clinical necessity by the anesthesia community; and if the potential of global warming impacts of inhaled nitrous oxide is brought into awareness of the anesthesia community then almost all use of nitrous oxide can be avoided [2]. Then there is the potential non-issue of contamination, infections and wastage of the trapped anesthetic agents that may interfere with the complete recovery of anesthetic agents for the recycling and reuse; however, the trapping of anesthetic agents will resolve the issue of the unchecked venting of anesthetic gases into the city atmosphere and the potential un-recoverable fraction (which will be minimal) of these trapped gases can still be potentially land-filled as waste cocktailed liquids rather than the global warming gases.

My awakening as an anesthesia provider to this potential but preventable contribution to the global warming is less than a year old when out of personal curiosity and endeavor, I discovered for myself and my quench that these upcoming technologies have been recently cleared to be used in United States. And this write-up is my further personal initiative and heartfelt environmental responsibility with no disguised incentives involved except to make some waves for the awareness of the anesthesia community. As far as the prior evidence for applicable strategy to contain/abolish the iatrogenic air pollutants without leaving any environmental signatures as anesthesia providers.

Even though Occupational Safety and Health Administration (OSHA) only provide guidelines (and not regulations) for workplace exposures to anesthetic gases based on the consensus and standards for the potential health risks to exposed hospital personnel, OSHA guidelines [12] have emphasized on the importance of the scavenging systems for non-quantifiable but definite risks to exposed hospital personnel. Hence, based on similar lines, it is time for us:

1. To recognize the scavenged anesthetic gases collection as a model service for maximally recovering the iatrogenic air pollutants without leaving any environmental signatures as anesthesia providers.
2. To initiate and support the American Society of Anesthesiologists for further validation studies of the applications of these technologies available for capturing and recycling the scavenged anesthetic gases.
3. To encourage the US Environmental Protection Agency to regulate and quantify the increasing burden of the vented untreated anesthetic gases.
4. To encourage the Joint Commission to consider the quantified environmental burden of the vented untreated anesthetic gases by the hospitals as a standard measure for their certification and accreditation of the hospitals.

References

1. Deltasorb Anesthesia Collection Service. Greening of Anesthesia in the operating rooms. Available at: http://www.bluezone.ca/green-facts Accessed May 19,
2012.
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