

**ENVIRONMENTAL IMPACT OF INHALATIONAL AGENTS USED IN  
OPERATING THEATRES IN SRI LANKA: A RETROSPECTIVE  
MULTI-CENTRE AUDIT**

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Inhalational anesthetic agents, particularly isoflurane and sevoflurane, are potent greenhouse gases that contribute to healthcare-related environmental pollution, especially in settings that lack proper scavenging systems. Despite global awareness, there is a scarcity of data on the environmental impact of anesthetic practices in low-resource settings, such as in Sri Lanka, highlighting a critical research gap. A retrospective audit assessed 315 theatre sessions, conducted over one month at National Hospital-Kandy, Teaching Hospital-Peradeniya and Dental Hospital-Peradeniya. Data were collected on volatile agent usage, surgery duration, fresh gas flow rates, and the availability and functionality of anesthetic gas scavenging systems (AGSS), using anesthesia theatre records maintained manually by doctors. Agent usage and CO<sub>2</sub> equivalent (CO<sub>2</sub>e) emissions were calculated using established equations to determine the volatile agent consumption and CO<sub>2</sub> equivalent. AGSS were unavailable in 204 sessions (64.8%), AGSS were present but not connected in 56 (17.8%), and AGSS were present merely venting gases into the external environment without proper degradation in 24 sessions (7.6%). Only 31 sessions (9.8%) used a properly functioning AGSS. The mean minimal alveolar concentration (MAC) fraction of agent consumption was 1.03%. Out of the total MAC fractions, the mean MAC fraction of isoflurane is 1.02% while sevoflurane is 1.13%. A total of 3519.5 mL of volatile agent fluid was used, but only 368.0 mL (10.50%) was effectively scavenged. More than 89% was released directly to the environment. Total emissions during the study period of one month amounted to 35.713 kg CO<sub>2</sub>e, isoflurane contributing 34.738 kg CO<sub>2</sub>e and sevoflurane 0.975 kg CO<sub>2</sub>e. Additionally, 16.5% of sessions used N<sub>2</sub> O/O<sub>2</sub> mixtures, compounding the environmental burden. The audit reflects major deficiencies in AGSS implementation in Sri Lankan operating theatres, resulting in significant environmental and occupational risks. Urgent interventions, including infrastructure improvement, staff education and adoption of low-flow or total intravenous anesthesia techniques, are needed to promote sustainable anesthetic practices.

**Keywords:** Anesthetic pollution, Environmental hazard, Inhalational agents, Scavenging systems, Volatile gases