

## Abstract

**Background:** The clinical use of inhaled anesthetics has been around for more than 150 years and are still commonly used in routine medical practice. Regarding the effects of exposure of healthcare workers to volatile anesthetics, the risk of miscarriage and infertility among female healthcare workers due to anesthetic gas contamination in the operating room has already been pointed out. However, few studies have investigated in detail the impacts of greenhouse gases used during surgery (volatile anesthetics and CO<sub>2</sub> used for insufflation). Nitrous oxide (N<sub>2</sub>O), originally used as a volatile anesthetic, is a greenhouse gas contributing to global warming. It is the third largest contributor after carbon dioxide and methane and is listed as a target for reduction under the Kyoto Protocol. This study examines the environmental impact of anesthetics, their packaging, and medical gases during the perioperative period, focusing on the amount of anesthetics used and their plastic packaging to determine whether there is a difference between general and local anesthesia and anesthesia methods.

**Methods:** The study included men aged 50 years or older in good general health who underwent laparoscopic inguinal hernia repair (including revision surgery), total abdominal pneumoperitoneum (TAPP), or radical hernia repair under local anesthesia at St. Luke's International Hospital from January 2013 to June 2022. The amount of CO<sub>2</sub> used for insufflation, various volatile anesthetics, and plastic packaging used for intravenous anesthetics were evaluated using the Global Warming Potential (GWP) converted to CO<sub>2</sub>.

**Results:** Total greenhouse gas emissions in laparoscopic surgery are Des 164739, Sevo 6,496, and 39818.5 for N<sub>2</sub>O, with average CO<sub>2</sub> emissions per operation in terms of GWP.

When intravenous anesthetics are used, the average is 26.5 compared to. an average of 2.08 for local anesthetics.

**Conclusion:** The results show that the amount of greenhouse gases emitted is significantly lower than in the case of laparoscopic surgery. Therefore, it can be concluded that whenever possible, surgeries should be performed under local anesthesia. In addition, low-flow anesthesia, in which the carrier gas flow rate in the anesthesia circuit is reduced to near the patient's oxygen consumption (approximately 5 mL/kg/min), has also been proposed to reduce greenhouse gas emissions. As a result, I conclude that surgeries should be performed under local anesthesia where feasible. Furthermore, the results indicate that low-flow anesthesia, in which the carrier gas flow rate in the anesthetic circuit is reduced to near the patient's oxygen consumption (approximately 5 mL/kg/min), is a favorable option.

**Keywords:** Inhalation anesthesia, Sevoflurane, Desflurane, Nitrous oxide (N<sub>2</sub>O), Global Warming Potential (GWP)