Background: Inhaled anesthesia can be modulated by ventilation, which is safer and more comfortable than intravenous anesthesia. Besides, inhaled anesthesia gas is non-flammable and can be recycled. The device should be simple and compact, ideal for space.

Objective: To effectively and safely perform Modified inhaled anesthesia in zero gravity environments.

1. Q: Can the anesthetic be vaporized even in Zero Gravity?
   - In the test, the machine worked in the comprehensive test for zero gravity for 10 minutes, so this device has the same performance.
   - The gas/ketamine was vaporized, but the gas efficiency decreased when used for a long time due to the temperature drops in the small internal environment.
   - This device can only vaporize the gas, and the efficiency decreased when used for a long time due to the temperature drops in the small internal environment.

2. Q: Can the ventilator valve work even in weightless?
   - The device was attached upside down to a flow analyzer (PF-300, intmedical), and an endurance test was carried out on the ground (300 bpm, 29-31 °C, 50% of humidity).
   - ABS filament spring: completely stopped after 7 mins. PLA filament spring: cleared for 1 MONTH of continuous operation.
   - The peak of gas is always greater than 5 times the baseline.
   - Manual foot pump that does not require electricity is useful in space.
   - The spiral spring is superior to the spiral-shaped spring, it is more flexible and has a wide stroke width.
   - The spiral spring can be easily produced in a short time by wrapping a filament around the 3D printed shaft and heating it, and it is also useful to heat the anesthesia delivery tube with an electric heating coil.

3. Q: Can anesthetic gas contamination be prevented?
   - "VetEquip’s VaporGuard™ Activated Charcoal Filter that prevented a waste anesthetic gas break-through. Effective in any position or orientation."
   - Unlike VetEquip’s WEB filter, the non-skid method can be used in zero gravity, and the edge weighs only 55g.
   - It might be possible to reduce air contamination when there is no need for drug refill by using this device, and no leakage can be prevented.

Conclusions: Our devices could be useful for the interplanetary, deep space and space long term manned missions, there will also be spinoffs for having in Earth more simple and compact devices.