

Canadian Guidance on Purposing Anesthesia Machines as ICU Ventilators

It is important to know that anesthetic gas machines (AGMs) are not intended for long-term ventilation and are being repurposed to respond to a critical shortage during the COVID-19 pandemic. It is understood that such off-label deployment of these devices has been approved by Health Canada for the existing pandemic emergency. A policy statement from Health Canada, which refers to the FDA policy document on the repurposing of AGMs, can be found by clicking here. [Notice: Importation or Sale of Ventilators- Use of FDA Guidance and Canadian requirements for Authorization under the Interim Order.](#)

There is essential information that physicians, respiratory therapists and anesthesia assistant who are using these devices need to know. The most important up-to-date information is available from the [American Society of Anesthesiology \(ASA\) website](#). For additional information, please see the links to [Draeger](#) and [General Electric Healthcare](#).

Ventilators on AGMs were intended for short-term respiratory support and differ from ICU-intended ventilators in several important respects. Familiarity with these differences is essential for the safe care of critically ill patients. Ideally, they should be operated by people sufficiently familiar with these devices or in conditions where there is immediate access to such expertise. Anesthesia machines produced by different manufacturers, differ with respect to the user interface. Ideally machines that are familiar to the users should be chosen for use. A summary comparison of the major device characteristics can be found on page 3 of the document entitled [APSF/ASA Guidelines on Purposing Anesthesia Machines as ICU Ventilators](#).

The AGM should be set up by an appropriately trained individual (see page 4 and 5 of the above document). Nitrous oxide hoses should be disconnected. If volatile agents are used, proper scavenging must be assured. Compliance compensation is optimal to ensure consistent minute ventilation. Inspired and end-tidal wave-form capnography, FiO₂ and spirometry monitoring are highly desirable.

[Guidance regarding protecting machines from contamination have been developed](#). An appropriate filter should be placed at the endotracheal tube connection and the expiratory hose where it connects to the AGM. A large (3L) reservoir bag should be used. Sampling ports should be on the machine end of the HME to prevent contamination. The fresh gas flows will generally exceed the minute ventilation to reduce rebreathing and reliance on the CO₂ absorbent. If possible, save the initial spirometry pressure-volume curve as a reference. When using an HME, active humidification is not required.

The optimal location for use of the AGM will be determined by the available space, ambient pressure, piped gas supply, isolation and the proximity to expertise.

AGMs were intended to be recalibrated daily. During such a self-test, the patient must be disconnected from and manually ventilated. If circumstances dictate, this may need to be briefly postponed. Appropriate safety precautions are needed to address exhaled gases and aerosolized particles when switching the patient to a self-inflating bag during the machine check.

If oxygen availability is limited, the fresh gas flow can be reduced, increasing the reliance of the CO₂ absorbent. In the absence of compliance compensation, pneumatically powered ventilators may provide reduced minute ventilation. The bellows of such machines should be driven by compressed air. Refer to page 7 of the above document.

AGMs were intended to be operated by a professional adjacent to the ventilator. Ambient noise may make auditory alarms difficult to hear. When a machine is used in unconventional ways on patients with limited physiologic reserve, there is little tolerance for error such as increased resistance resulting from wet HMEs (which can obstruct gas flow), fluid in the circuit, leaks or compliance changes.