

Anesthetic Machine & Equipment

REGULAR MAINTENANCE GUIDELINES

The importance of anesthetic machine maintenance is often overlooked. The best way to avoid problems is to institute regular maintenance schedule for all machines and equipment. The following information will help create a system to maintain equipment for better patient care and longevity of equipment.

Servicing of Anesthetic Machines

- It is advised to follow the manufacturer's recommendations.
- Calibration of vaporizers should be performed annually by a certified technician.
 - » When filling the vaporizer, make sure the appropriate anesthetic for the vaporizer is used.
- Machines should be leak checked before each use. The following gives a step-by-step checklist for leak checking machines.
 1. Ensure the machine is connected to an oxygen source & the scavenge system is properly connected. Oxygen source may be from an oxygen cylinder, O₂ generator, or central system.
 2. Attach the appropriate reservoir bag and breathing tubes for the patient.
 3. Securely occlude the Y-piece with your thumb or palm of your hand.
 4. Completely CLOSE the pop-off valve.
 5. Fill the reservoir bag with oxygen up to 20cm H₂O. If there is no leak, this pressure should be able to be maintained.
 6. Turn off the oxygen and remove your hand from the Y-piece.
 7. Completely OPEN the pop-off valve.
- If there is a leak in the system, the following sites are most prone to leaks.
 - » Soda lime canister – Ensure the canister is properly seated & secured to the machine.
 - Granules may become entrapped between the soda lime canister and the gasket.
 - » Rebreathing bag – Ensure there is not a crack in the bag; this can occur after repeated cleanings or over time.
 - » Breathing tubes – Ensure they are securely attached to the machine, there are no holes in the tubing, and that the Y-piece is adequately occluded during the leak check.
 - » Check the endotracheal tube for leaks - this may be done by pressurizing air in the tube and placing the tube underwater.
 - » The circuit system (least likely one to occur) – Check for cracks in the hosing.
 - » Inspiratory & Expiratory valves – Check that the screws on the housing are tightened and that the valves do not have any apparent damage.

***If a leak is found, use soapy water to spray around the common leak sites.
Soap bubbles will arise from the leak site indicating a problem.***

Anesthetic Machine & Equipment Maintenance Guidelines

Scavenge Equipment

- **Soda Lime Granules** should be changed after every 6 to 8 hours of use. The following are signs of overused granules.
 - » Hard, brittle granules
 - » Color change to purple of one third or more of the granules (Remember the granules will change color back to white after several hours of non-use.)
- **Scavenge system** use in the form of activated charcoal canisters should be evaluated by their weight as to whether they are fully used. When receiving these from the company, there should be manufacturer instructions as to how to weigh the canister. (Standard canisters need to be changed after a weight gain of 50 grams, therefore a scale sensitive to the gram is needed.)

Cleaning & Disinfecting of Equipment

- **Endotracheal (ET) tubes and cuffs** should be evaluated prior to each use to check for leaks.
- **Masks, breathing hoses, reservoir bags, and ET tubes** should be disinfected after each use to prevent the spread of bacterial/fungal contamination. This equipment can be cleaned with liquid soap and an extended length soft bristle brush then fully soaked in diluted chlorhexidine (18mls of chlorhexidine for every 32 ounces of water). *Cleaning agents such as glutaraldehyde solutions or ethylene oxide gas sterilization should not be used because they have the potential to cause tracheal necrosis.

Decreasing Pollution Exposure for Employees

The following techniques, will provide a lower risk for anesthetic gas exposure to employees.

- Attach the breathing circuit to the patient prior to turning on the vaporizer.
- Ensure endotracheal tube cuffs create a completely sealed airway. You can check for a leak in the cuff by giving a positive pressure breath up to 15 - 20mmHg. During this time, if stable positive pressure can not be achieved, air is heard escaping from the patient's mouth, or the reservoir bag decompresses of air after stable positive pressure is reached then additional air should be added to the cuff. (Use caution to prevent over inflation of the cuff which can cause ischemia.)
- When detaching a patient from the anesthesia machine, ensure the oxygen and vaporizer are turned off.
- Use the scavenge system to eliminate inhalants when flushing the breathing circuit for patients that will remain on oxygen during recovery to remove any remnants of anesthetic gases in the system.
- Minimize or do not use a masked or closed container inhalant anesthetic induction of patients whenever possible.
- Ensure all anesthetic machines have a scavenge system, such as an activated charcoal canister or vacuum system.
- Use the lowest fresh-gas flow rates that allow adequate delivery of anesthetic to the patient. Higher fresh-gas flow rates causing a greater amount of waste gases.

Bonnie Johnson, LVT - UTCVM Anesthesia