SUBJECT: ANESTHESIA MACHINE SAFETY REGULATIONS

POLICY:

The anesthesia provider is responsible for checking the anesthesia machine at the beginning of each day that surgical procedures will be performed.

Most injuries due to the anesthesia machine and circuit breathing system can be avoided by a thorough instrument check before each case. This holds true even if the anesthesia provider was the last person to use the equipment. The following checking procedure takes less than one minute to perform and will detect most of the more common and serious problems.

**ONLY NON-FLAMMABLE ANESTHETIC GASES ARE TO BE USED**

PROCEDURE:

The Machine.

1. Close the flow control valves.
   
   Even if they were closed at the end of the previous day they may have been bumped by someone cleaning the top of the machine. If a flow control valve is open and a cylinder valve then opened, the indicator in the flow meter may shoot up to the top of the tube and be damaged or stuck.

2. Check cylinder supplies.

   It is essential to verify that emergency oxygen and nitrous oxide supplies are available in case the piped system fails or the delivery hose develops a leak.

   If the machine is to be used in a location where piped gases are not available, both oxygen and nitrous oxide tanks should be checked to see that one cylinder is full (Oxygen, 2100 PSIG, Nitrous Oxide, 780 PSIG) and that an additional tank has adequate pressure as indicated above. Only the full (reserve) cylinder valve should be closed while the other (in-use) cylinder valve should be left wide open.

3. Cylinders of other gases should be checked at this time.
   
   a. Connect pipeline hoses.
   
   b. Turn on oxygen alarm, if present.
   
   c. Check flowmeters.
Open each flow control valve, checking to see that the indicator moves smoothly and does not stick and that it returns to 0 when the flow control valve is closed. If the indicator does not function properly, the machine should be taken from service and the problem corrected. A sticking flowmeter indicator is extremely dangerous.

4. Check vaporizers.

Check vaporizers for liquid level and that the filler cap is tight. Add more liquid agent if necessary.

**NOTE:** It is better to fill vaporizers at the end of the day when the operating room is empty, to keep exposure of operating room personnel to a minimum.

5. Check machine for leaks.

The anesthesia machine should always be checked for leaks before use since a leak in the machine could result in a hypoxic mixture, an alteration in the agent concentration delivered or significant operating room pollution. Unfortunately, the commonly used method of checking for leaks in the circle system does not constitute a check for leaks in the anesthesia machine in most cases.

a. Turn vaporizer to the ON position.

b. Attach a pressure gauge (from a standard blood pressure apparatus) to the machine outlet.

c. Open the flow control valve associated with a built-in, measured flow vaporizer (such as the copper kettle or vernitrol), until a pressure of 22mm Hg (30cm water) is just maintained on the sphygmomanometer. If no built-in vaporizer is present, use the oxygen flow control valve and flowmeter. When equilibrium has been achieved the flow rate on the flowmeter is the leak rate of the machine. It should be less than 50cc per minute.

If a leak of greater than 50cc/minute is found, turn off the vaporizer and repeat the test. If this causes the leak rate to decrease, determine in which vaporizer the leak is present. A loose filler cap is a common cause for a leak in a vaporizer. Most other problems will require consultation with the manufacturer for correction. A leak in a vaporizer can be the source of operating room contamination with fully saturated vapor (e.g., 30% halothane). Thus, a small leak in a vaporizer can be the source of massive pollution. However, a leak in a vaporizer will usually not pose a threat to a patient. So, if taking the machine out of service will cause great inconvenience and if the leak is not large or one does not take operating room pollution very seriously, the machine can still be used until the manufacturer corrects the leak. One should be aware that it will take more flow to the vaporizer (in the case of measured-flow vaporizers) or a higher setting on the concentration
dial (in the case of direct-reading vaporizers) to obtain the same anesthetic concentration. Consideration should be given to using the machine without using the leaking vaporizer.

If, after the vaporizers are turned OFF, a leak of greater than 50cc/minute is still present, the machine should be taken out of service until the leak can be located and corrected.

After checking the machine for leaks, it is important that both the flowmeter and the vaporizers be turned OFF. An ON-OFF switch on a vaporizer should never be left in the ON position if the vaporizer is not being used, since pressure fluctuations inside the machine may be transmitted to the vaporizing chamber, resulting in an intermittent cloud of anesthetic vapor being delivered to the machine outlet.