

## Validating Anesthesia Products to Meet Clinical Needs

### General Considerations

- Inventory all available AMs and report number and specifications to facility administration
- Plan for deployment and staffing in advance
- When in use, an anesthesia professional should be immediately available at all times to manage and assist
- Consultation with intensivists regarding individual ventilator strategies is desirable
- Routine rounding should be performed by an anesthesia professional on all AMs in use as long term ventilators
- Schedules and checklists for specific requirements should be created for each AM (e.g., daily machine check)
- Other personnel (e.g. CC RNs/CRTs) should be instructed to not adjust AM ventilators without an anesthesia practitioner's involvement
- Observation for CO<sub>2</sub> absorber exhaustion, moisture accumulation in the circuit and HMEF function degradation should be part of routine rounding

### Specific mechanical guidelines

#### Product Needs

- Remove or drain and lock vaporizers and nitrous cylinder and hoses
- Assure that hospital pipeline air and oxygen, or appropriately sized cylinders, are available
- In the event that WAGD or main vacuum line suction connections are unavailable the scavenger system should be disconnected to avoid dangerous over pressurization of the breathing circuit
- If O<sub>2</sub> supplies are in question, bellows ventilator drive gas can be reconfigured by biomedical engineering to use compressed air (GE)
- APL set to 0 cm H<sub>2</sub>O and large reservoir bag if available

#### Filtration

- A HMEF with high viral filtration efficiency (VFE) should be installed at the "Y" and a second high VFE (HEPA) filter should be installed at the expiratory inlet to the AM
- Replacement HMEF/HEPA filters should be immediately available and a means to occlude the ETT during HMEF replacement should be assured (e.g., chest tube clamp) in order to reduce airborne contamination

#### Product Monitoring, Testing

- If continuous ETCO<sub>2</sub> monitoring is in use the source should be from the machine side of the HMEF
- If not feasible due to materials then insert a Luer lock disc HEPA filter at the insertion point to the AGM
- Back up manual resuscitator with appropriate HEPA filter available at all times
- While AM self-testing is recommended every 24 hours manufacturers have extended this to 72 hours during the crisis
- Power should be cycled between patients

### **Clinical guidelines**

- Due to rebreathing in a circle system, FiO<sub>2</sub> must be monitored
- Oxygen sensors must be recalibrated at regular intervals
- Fresh gas flow and FiO<sub>2</sub> may be adjusted in different ways based on manufacturer
- Rebreathing of exhaled gas is the distinguishing feature when comparing AMs and other ventilators
  - The percentage of rebreathed gas is the result of Fresh Gas Flow(FGF) in to the circle system
  - Higher FGF=less rebreathing until FGF exceeds Minute Ventilation (MV) at which time there is little to no rebreathing
  - CO<sub>2</sub> absorber (e.g., soda lime) is necessary to allow rebreathing without CO<sub>2</sub> accumulation
  - Higher FGFs result in lower humidity and potential mucous plugging and endothelial injury but spare the CO<sub>2</sub> absorbent
  - Lower FGFs result in higher passive humidity and potential water accumulation in the circuit as well as early degradation of the CO<sub>2</sub> absorbent and decreased filter efficiency
  - Active humidification of the circuit is not recommended and accumulated water must be removed from the circuit
- Available ventilator modes vary by manufacturer, consult with CC physician regarding the ventilation strategy for each patient individually
  - The highest featured AMs should be deployed first and should at a minimum have SIMV+PS ventilation mode