

## **Ventilator Circuits**

All the tubing, humidifiers, and manifolds not permanently attached to the ventilator

### **Components**

Main flow tube

Humidifier

Pt. Adapter

Patient wye

Water traps

Heated wires

Flow sensors

Exhalation line

Exhalation valve

Manifold

Peep attachment

Spirometer

Proximal pressure line

Temp sensor(s)

Nebulizer line

Deadspace

Monitor attachments

### **Circuit Compliance**

Circuit will expand with pressure and contract when pressure is released

The ventilator will measure this as part of the patient breath

The volume compressed in the tubing does not go to the patient

Many ventilators will automatically compensate

Effects of components on circuit compliance

Each additional component will:

Change the compressible volume of the circuit

Enhance the possibility of leaks

Use of heated humidifiers will increase and change the compressible volume

Heat and humidity will increase the possibility of disconnect

## **Ventilator Troubleshooting**

A systematic approach to correcting problems

### **4 Main Causes of Problems (Alarms)**

Electrical

Gases

High pressure

Low pressure

### **Is the problem electrical?**

Internal battery lamp illuminated

Switch over alarm

**Is the problem with gases?**

Low gas pressure alarms  
O2 concentration alarms

**Is the problem excessive pressures?**

High pressure alarms  
Power light on  
May have low volume alarm

**Is the problem Low pressures or volumes?**

Low exhaled volume alarm/display  
Low pressure alarm/display  
Power light/displays on  
Ventilator cycling

**Rule # 1 of Troubleshooting**

Assure patient safety  
There should always be a second (manual) ventilator in the room

**Electrical problems**

Assess patient and remove the patient and hand ventilate if at all questionable.  
Check power switch  
Plugged in?  
Power cord attached  
Fuses or circuit breakers  
Replace ventilator

**Gas Problems**

Assess patient and remove patient and hand ventilate if needed  
Check inlet gauges or system pressures to detect faulty gas source  
Check quick connects  
Check hoses  
Check filters  
Replace ventilator

**Low Volumes/Pressures**

(Leak/Disconnect)

Assess patient and If exhaled volume is  $> 20\%$  below set volume, remove patient and hand ventilate  
Check appropriateness of alarm setting  
Check exhaled Vt with respirometer  
If exhaled volume by respirometer is O.K. replace ventilator  
Check Vt at machine outlet and if lower than set, replace ventilator  
Check all connections from vent. to patient and back and perform minimum leak technique  
Replace ventilator if problem cannot be found

### **Excessive pressures**

Assess patient and check patient's tolerance of ventilation  
Check Vt, if less than 1/2 the set volume X 4 breaths, hand ventilate  
Check appropriateness of the high pressure alarm settings  
Auscultate and suction as needed  
Check for changes in flow rate  
Check for kinks  
Check patency of E.T. tube by attempting to pass a suction catheter  
Consider air trapping  
Replace ventilator

### **In All Cases**

Assess patient and...  
Remain calm  
Call for help  
Assess and assure patient confidence  
**Do not** scratch your head  
Replace any questionable ventilator

### **Conclusion**

Contact [milischr@westernnc.edu](mailto:milischr@westernnc.edu) if there were any problems with the presentation

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