

## Appendix C: Troubleshooting DOPE Algorithm

Alarm	DOPE	Possible Cause	Troubleshooting
High Pressure	D	Mainstem intubation	If the tube has advanced and unilateral ventilation is confirmed, retract the tube to proper depth using bougie technique to maintain placement.
High Pressure	D	Esophageal intubation	If the tube is advanced and unilateral ventilation is not present, rule out esophageal intubation – evaluate with DL or VL. If breath sounds are present over abdomen, or gastric distention noted, remove the ET tube and secure airway by other means and place gastric tube for evacuation of gastric contents.
High Pressure	O	Obstruction of ET tube	Place patient on FiO <sub>2</sub> 1.0 (100%) and prepare suction equipment. Suction airway using standard technique. If inhalation injury is suspected (burn, agent), saline may be used to facilitate suctioning.
High Pressure	O/E	Obstruction of ventilator circuit	Ensure circuit connections are attached and not kinked paying particular attention to connections and sharp bends.
High Pressure	P	Pulmonary circuit	Rule out/treat hemothorax / pneumothorax.
High Pressure	P	Pulmonary circuit	Consider Pulmonary Edema. Prolong Inspiratory time if appropriate (i.e. adjust from 1:3 to 1:2 to 1:1).
High Pressure	P	Pulmonary circuit	Consider airway swelling; may need to add or increase Pressure Support
High Pressure	P	Pulmonary circuit	Evaluate Tidal Volume. Consider lowering by 1cc/kg (min. 4cc/kg).
High Pressure	P	Patient arousal	Address analgesia/sedation needs.
High Pressure	P	Stacked breath/air trapping	Disconnect patient from the circuit and allow full exhale. Address cause (patient triggering, high rate, incomplete exhalation).
High Pressure	P	Chest tube malfunction	If hemothorax / pneumothorax are suspected, disconnect all attachments and troubleshoot chest tube and components.
High Pressure	P	Patient position	If laying supine, elevate head of bed to reduce gravitational pressure on the chest.
High Pressure	E	Alarm setting	After ensuring patient optimization, adjust alarm settings.
Low Pressure	D	Extubation	If tube has been removed from the trachea, secure the airway using method within scope/skill of the provider.
Low Pressure	D	Esophageal intubation	If tube is advanced and unilateral ventilation is not present, rule out esophageal intubation. If breath sounds present over abdomen, or gastric distention noted, remove ET tube and secure airway by other means and place gastric tube for evacuation of gastric contents.
Low Pressure	E	ET tube balloon	Ensure ET Tube cuff is inflated (25-35 cmH <sub>2</sub> O). If the cuff will not maintain inflation, exchange ET tube using bougie technique.
Low Pressure	E	Ventilator disconnect/leak	Ensure all connections are attached securely to the appropriate point. Run bare hand along circuit to feel any air escaping during inhalation paying special attention to valves and connections.
Low SpO <sub>2</sub>	DOPE	Assess patient	For acute desaturation, place FiO <sub>2</sub> at 1.0 (100%). Check chest rise and fall, EtCO <sub>2</sub> , SpO <sub>2</sub> probe placement. Check all conditions from high/low pressure chart to rule out other alarm failures.
Low SpO <sub>2</sub>	x	Increase in altitude	Increase FiO <sub>2</sub> to compensate for decrease in pressure.
Low SpO <sub>2</sub>	x	Patient deterioration	If desaturation is gradual and presumed to be caused by patient pathology, increase PEEP and FiO <sub>2</sub> in a stepwise fashion according to ARDSNet table.
Low SpO <sub>2</sub>	x	Patient deterioration	Attempt alveolar recruitment maneuvers. Inflation to 30 - 40 cm H <sub>2</sub> O for 30 - 40 seconds (difficult with PMI).
Alarm	DOPE	Possible Cause	Troubleshooting
			Recruitment maneuver can be performed with bag-valve manual ventilation. <ol style="list-style-type: none"> <li>Set PEEP valve on bag-valve unit to 15 - 20 cm H<sub>2</sub>O.</li> <li>Deliver five sequential breaths, each held for 5 - 8 seconds.</li> <li>Watch blood pressure closely. Terminate if hypotension develops.</li> <li>Clamp endotracheal tube while switching between ventilator and bag.</li> <li>Immediately assess for tension pneumothorax, if applicable.</li> </ol>
Low SpO <sub>2</sub>	E	O <sub>2</sub> supply	Check O <sub>2</sub> PSI and condition of hose/connections.)
High EtCO <sub>2</sub>	E	Incorrect vent settings	V <sub>E</sub> may be too low (Adjust V <sub>T</sub> f/l:l:E for patients IWB).
High EtCO <sub>2</sub>	x	Hypermetabolic state	Address pain, shivering, hyperthermia / infection.
High EtCO <sub>2</sub>	x	Respiratory insufficiency	Increase rate (current EtCO <sub>2</sub> x current rate/40).V <sub>E</sub> may be too high (Ensure proper V <sub>T</sub> /f/l:l:E for patients IWB).
Low EtCO <sub>2</sub>	E	Incorrect vent settings	V <sub>E</sub> may be too high (Ensure proper V <sub>T</sub> /f/l:l:E for patients IWB).
Low EtCO <sub>2</sub>		Ventilator dyssynchrony	If on AC and patient is not properly sedated, the patient may be breathing over the ventilator settings, increasing their V <sub>E</sub> . Consider sedation medications followed by paralytics, as needed.
Low EtCO <sub>2</sub>	x	Low perfusion state (hypovolemia or sepsis)	CHECK PATIENT'S PULSE FOLLOWING RAPID DROP. Continue to resuscitate patient within scope and skill.
Low EtCO <sub>2</sub>	x	Decrease in alveolar ventilation	Suction patient if suspected mucus/secretion plug. If associated with high pressure alarm, consider alveolar distention (air trapping/stacked breathing): remove patient from ventilator and allow full exhale.
Low EtCO <sub>2</sub>	x	Respiratory compensation (metabolic acidosis)	DO NOT ATTEMPT TO NORMALIZE patient's breathing without ABG and expert consultation.
Low EtCO <sub>2</sub>	x	Low perfusion state (hypovolemia or sepsis)	CHECK PATIENT'S PULSE FOLLOWING RAPID DROP. Continue to resuscitate patient within scope and skill.
Low EtCO <sub>2</sub>	x	Decrease in alveolar ventilation	Suction patient if suspected mucus/secretion plug. If associated with high pressure alarm, consider alveolar distention (air trapping/stacked breathing): remove patient from ventilator and allow full exhale.
Low EtCO <sub>2</sub>	x	Respiratory compensation (metabolic acidosis)	DO NOT ATTEMPT TO NORMALIZE patient's breathing without ABG and expert consultation.