

# Mechanical Ventilation Setup

## Step 1: Use volume control / assist control mode (VC/AC or CMV)

You set the **volume**, patient determines the **pressure**



## Step 2: Select initial ventilator settings

**Tidal volume ( $V_t$ ):** 4 – 8 mL/kg ideal body weight (~ 450 cc for men & 350 cc for women; see  $V_t$  table)

**Respiratory rate (RR):** 20 breaths per minute (10-35 depending on pH and auto-peep)

**Fraction of inspired oxygen ( $FiO_2$ ):** Start high (80-100%), target  $SpO_2$  90-95% (goal  $FiO_2 \leq 50\%$ )

**Positive end expiratory pressure (PEEP):** Start at 8-10 cm  $H_2O$

**Flow:** 60 L/min



## Step 3: Obtain ABG in 30 minutes

**Target pH 7.30 – 7.40** (pH 7.20, permissive hypercapnia acceptable in ARDS)

**Target  $PaO_2$  60-80 mmHg**

**To  $\uparrow PaO_2 \rightarrow \uparrow FiO_2$ , PEEP** (consider both pulmonary and cardiovascular effects of PEEP)

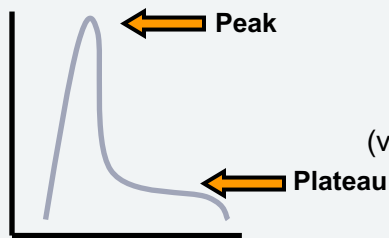
**To  $\downarrow PaCO_2 \rightarrow \uparrow V_t$ , RR** (except if auto-peep – i.e. asthma. where  $\downarrow RR$  +/- paralysis is needed)

# Troubleshooting

## Acute worsening on mechanical ventilation

Dislodged Endotracheal tube (ETT)  
Obstruction (mucous plug, biting ETT)  
Pneumothorax, pleural effusion/hemothorax  
Equipment malfunction  
Rigidity of chest/abdominal wall (e.g. compartment syndrome)  
Stacking breaths (Double triggering, Auto PEEP)

Measure plateau pressure (sedate, add inspiratory pause +/- bolus paralytic)



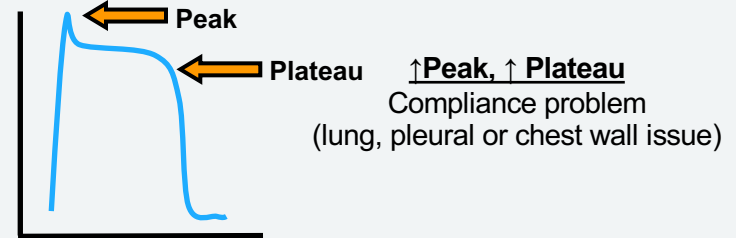
↑Peak, Normal Plateau  
Resistance problem  
(ventilator, large airway issue)

**Step 1:** Disconnect the ventilator and bag the patient

**Step 2a:** If easy bag → ventilator or circuit issue

OR

**Step 2b:** If difficult bag → patient issue (try suction, bronchodilators, make sure patient is not biting the ETT or consider sedation +/- intermittent paralysis)



↑Peak, ↑ Plateau  
Compliance problem  
(lung, pleural or chest wall issue)

### 3 P's + C

Parenchyma (pneumonia, ARDS, edema) → keep plateau pressure  $\leq 30$  ( $\downarrow V_t$ , sedation +/- paralysis)

Pleural (pneumothorax, effusion) → chest tube

Auto-PEEP →  $\downarrow RR$ ,  $\downarrow V_t$  or  $\uparrow$ flow, +/- paralysis

Chest wall: Burns, abdominal compartment syndrome, obesity, pregnancy

# Mechanical Ventilation Liberation

## Step 1: Screen patient daily for a safe spontaneous breathing trial (SBT)

SpO<sub>2</sub> > 90% on FiO<sub>2</sub> ≤ 50%, PEEP ≤ 8 cm H<sub>2</sub>O

Spontaneous breathing efforts, RR < 30/min

No active myocardial ischemia + no (or low) vasopressors

Minimal to no sedation, no recent neuromuscular blockade

Following commands, good cough, no evidence of increased intra-cranial pressure



## Step 2: Switch to pressure support ventilation for SBT

Pressure support ≤ 8 cm H<sub>2</sub>O

PEEP ~ 5 cm H<sub>2</sub>O

FiO<sub>2</sub> ≤ 50%

Assess for changes in BP, RR, V<sub>t</sub>, mental status, accessory muscle use



## Step 3: If breathing comfortably after 30 minutes

Cuff leak test (**ONLY** if traumatic intubation, upper airway concerns)

Extubate to supplemental oxygen (consider extubating directly to non-invasive ventilation or high flow nasal cannula if high risk)

# VT Table: Nomogram for tidal volume per predicted body weight

MALE							FEMALE						
Height	Height	IBW (kg)	Tidal Volume				Height	Height	IBW (kg)	Tidal Volume			
(inches)	(cm)		6 ml	7 ml	8 ml	10 ml	(inches)	(cm)		6 ml	7 ml	8 ml	10 ml
48	120.0	22.4	134	157	179	224	48	120.0	17.9	107	125	143	179
49	122.5	24.7	148	173	198	247	49	122.5	20.2	121	141	162	202
50	125.0	27.0	162	189	216	270	50	125.0	22.5	135	158	180	225
51	127.5	29.3	176	205	234	293	51	127.5	24.8	149	174	198	248
52	130.0	31.6	190	221	253	316	52	130.0	27.1	163	190	217	271
53	132.5	33.9	203	237	271	339	53	132.5	29.4	176	206	235	294
54	135.0	36.2	217	253	290	362	54	135.0	31.7	190	222	254	317
55	137.5	38.5	231	270	308	385	55	137.5	34.0	204	238	272	340
56	140.0	40.8	245	286	326	408	56	140.0	36.3	218	254	290	363
57	142.5	43.1	259	302	345	431	57	142.5	38.6	232	270	309	386
58	145.0	45.4	272	318	363	454	58	145.0	40.9	245	286	327	409
59	147.5	47.7	286	334	382	477	59	147.5	43.2	259	302	346	432
60	150.0	50.0	300	350	400	500	60	150.0	45.5	273	319	364	455
61	152.5	52.3	314	366	418	523	61	152.5	47.8	287	335	382	478
62	155.0	54.6	328	382	437	546	62	155.0	50.1	301	351	401	501
63	157.5	56.9	341	398	455	569	63	157.5	52.4	314	367	419	524
64	160.0	59.2	355	414	474	592	64	160.0	54.7	328	383	438	547
65	162.5	61.5	369	431	492	615	65	162.5	57.0	342	399	456	570
66	165.0	63.8	383	447	510	638	66	165.0	59.3	356	415	474	593
67	167.5	66.1	397	463	529	661	67	167.5	61.6	370	431	493	616
68	170.0	68.4	410	479	547	684	68	170.0	63.9	383	447	511	639
69	172.5	70.7	424	495	566	707	69	172.5	66.2	397	463	530	662
70	175.0	73.0	438	511	584	730	70	175.0	68.5	411	480	548	685