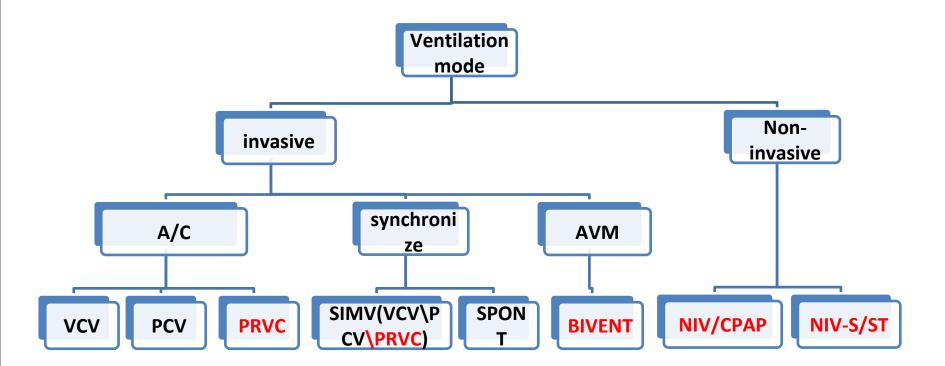
Fundamental of Ventilator Clinical Perspective of Learning

Beijing Aeonmed Co., Ltd. Tiffany Yang/ 2019.01.01



Ventilation Mode



AEO/MED idgTypes of Ventilation and Common Ventilation Modes

Туре

Non-invasive



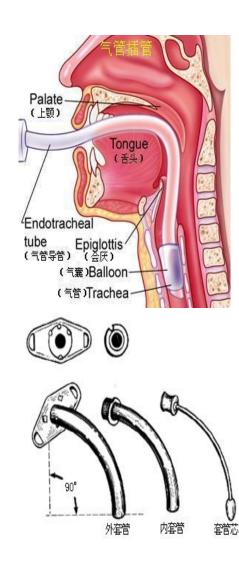


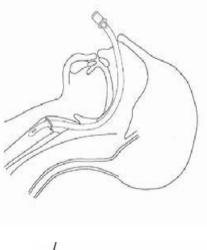


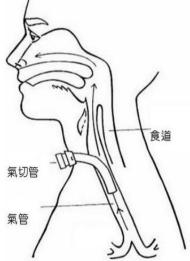


Туре

Invasive



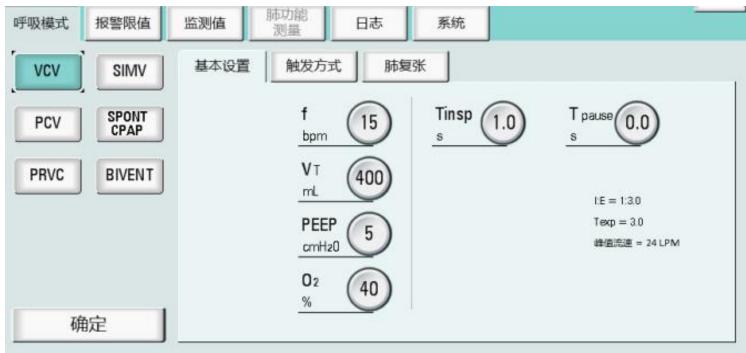




VCV

Volume controlled ventilation. Ventilator controls delivered volume. Volume stays constant breath to breath. Inspiratory pressure varies with change in the patient's lung compliance

and airway resistance



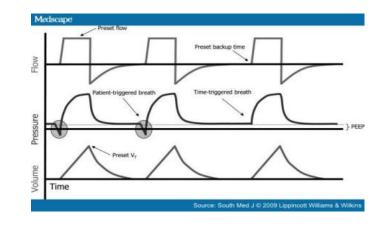
VCV

Advantage:

- Guarantee VT;
- Allow resting of respiratory muscle

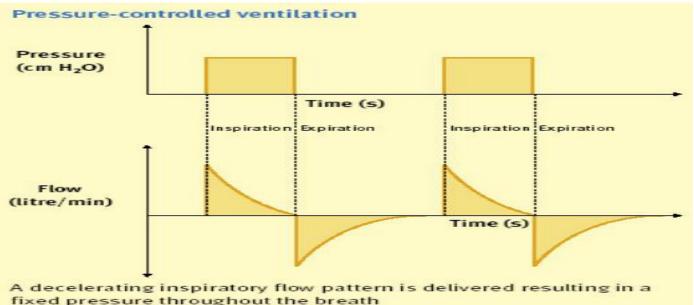
Disadvantage:

- Machine-patient asynchrony;
- Bad for muscle exercise;
- Hypoventilation or hyperventilation;



PCV: The ventilator controls the pressure throughout inspiration so there is basically one pressure pattern. Flow (volume) varies with patient's compliance and resistence. Assist/Control: all machine breaths that patient may trigger or

not. A backup breaths/min rate is set.



PCV

R								
		待	机					
				主菜单				
呼吸模式	报警限值	监测值	肺功能测量	日志	系统			
VCV	SIMV	基本设置	触发方式	- 导管社	ト 偿			
PCV	SPONT CPAP		f (15	Tinsp s	1.0		
PRVC	BIVENT		Pinsp cmH20	20	T slope	0.1	1:E = 1:3.0	
			PEEP cmH20	5			Texp = 3.0	
T	ic ا		02 %	40				

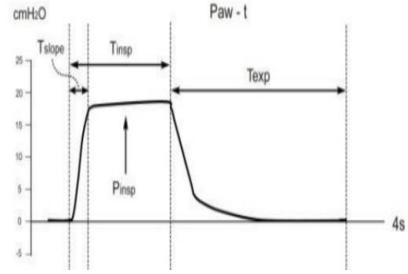
PCV

Advantage:

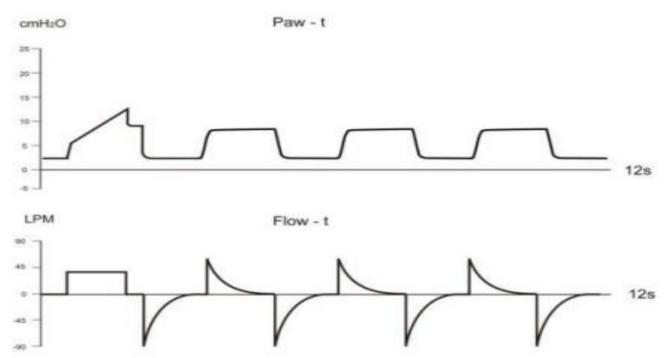
- With controlled Ppeak, prevent barotrama
- Improve gas distribution, promote gas exchange

Disadvantage:

- Frequent adjusting of pressure control level to meet demand VT;
- Cannot ensure VT when lung compliance level change







VCV preset VT, safe guarantee ventilatory efficiency; PCV controlled Ppeak, prevent lung damage; PRVC combine the advantage of these two.

PRVC: Pressure regulation volume controlled (volume targeted pressure control): Dual-control modes of ventilation are auto-regulated pressure-controlled modes of mechanical ventilation with a user-selected tidal volume target. The ventilator adjusts the pressure limit of the next breath as necessary according to the previous breath's measured exhaled tidal volume.

PRVC

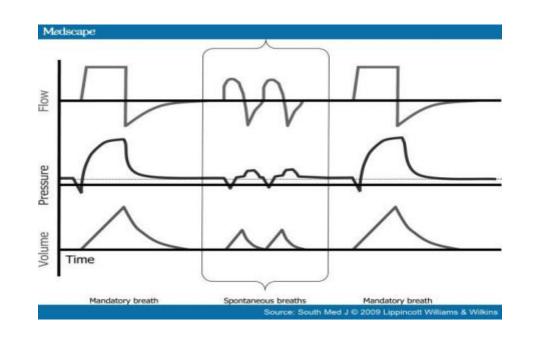
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				主菜单			ftotal	
呼吸模式	报警限值	监测值	肺功能 测量	日志	系统			X
VCV	SIMV	」 基本设置	● 触发方)		
PCV	SPONT CPAP		f bpm	15	Tinsp (1.0		
 PRVC	BIVENT		V T mL	400	T slope (0.1	1:E = 1:3.0	
			PEE cmH				Texp = 3.0	
	确定	1	02 %	40				

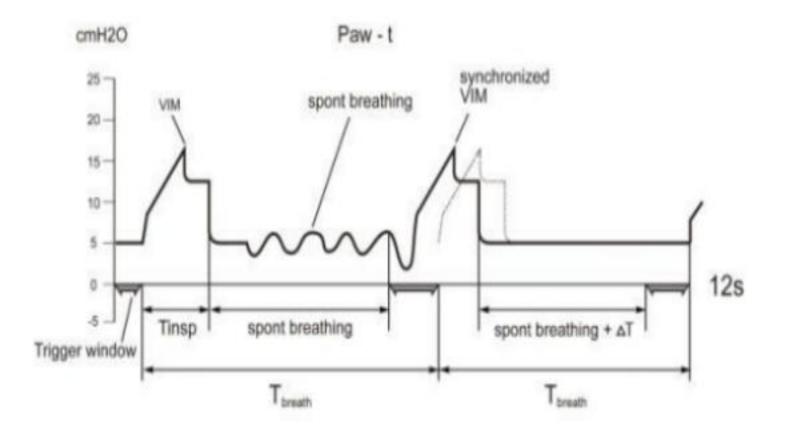
PRVC

Clinical advantage:

- With fast and accurate pressure regulation, take no more than 3 breathing cycle to meet target VT
- Ventilate pt within safe airway pressure range, minimize chances of barotrauma
- Rdyn, Cdyn to monitor lung mechanics, make the pressure regulation more accurate.
- > Promote machine-patient synchrony, increase patient comfort level.

SIMV: Synchronized intermitted mandatory ventilation. Sets a fixed number of machine breaths and allows the patient to breath spontaneously in between machine breaths.









		行	科	,			
						-	ftotal
呼吸模式	报警限值	监测值	肺功能测量	主菜单 日志	系统		
VCV	SIMV	SIMV(VC)		CV) SIMV(P	RVC)		
PCV	SPONT CPAP	基本设计		pm 10	Tins s	p (1.0)	
PRVC	BIVENT	触发方:		T (400)	T sloj s	De (0.1)	
			PI	EEP 5	Psup cmHz		

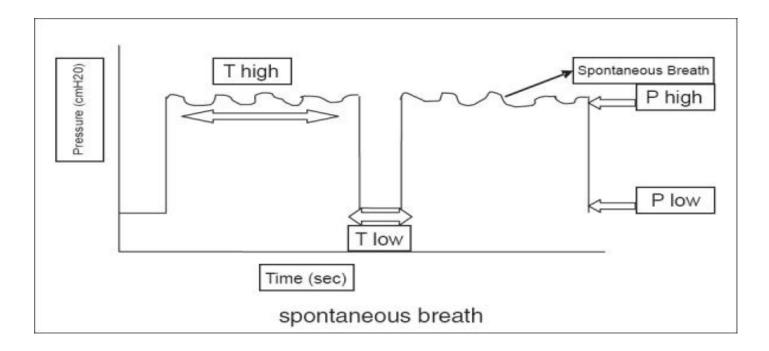


SIMV (VCV) +PS SIMV (PCV) +PS SIMV (PRVC) +PS

- Ensure patient adequate ventilation while allowing for SB
- Promote lung exercise and weaning process by proper usage
- > Suitable for patient with SB or prepare for extubation

BIVENT

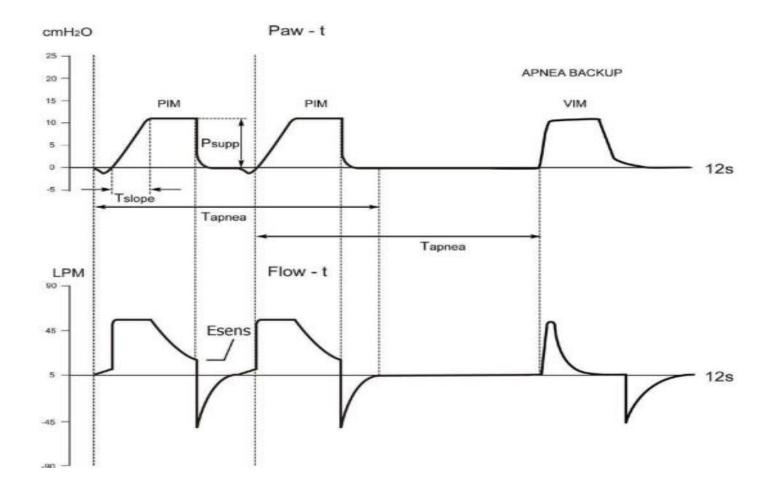
Basically two levels of CPAP. Pt able to breath spontaneously at the upper pressure with or without added PS. The drop from higher to lower pressure is the "release" to eliminate CO2.



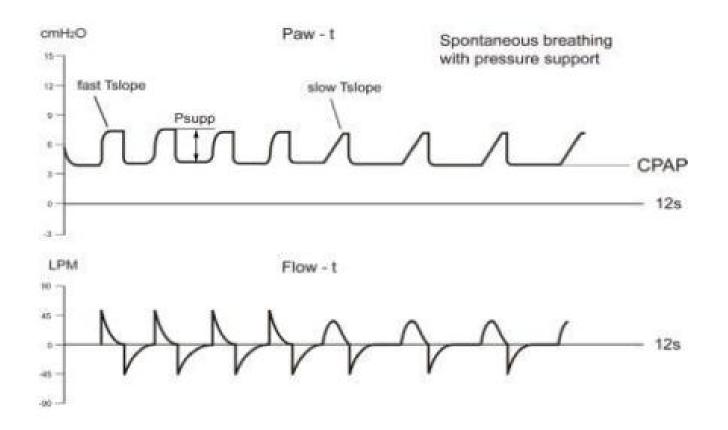
BIVENT

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呼吸模式	报警限值	监测值	肺功能 日志	系统		<u>×</u> _	
VCV	SIMV	基本设置	触发方式 导管	补偿			
PCV	SPONT CPAP		Thigh 1.0	Tlow 3.0			
PRVC	BIVENT		Phigh cmH20 25	T slope 0.1			
			Plow 5	Psupp			
		备份通气	02 40	Esens 25			
硝	腚	导管补偿关	<u>*0</u>	% 20		C	у л

SPONT



CPAP



Initial ventilator settings:

- Vt: 8-12 ml/ kg IBW
- f: 8-12 breath/min
- FiO2: 100%
- I:E ratio: 1:2-1:4
- PEEP: $3-5 \text{ cm H}_2 \text{ O}$
- Sensitivity: -1 to -2 cm H₂ O.

Alarm settings

MV: Low minute volume shall be maintained at 50% of the exhaled minute volume. High minute volume alarms shall be maintained at 50 to 100% above the exhaled minute volume.

Paw: 10 to 15 cmH2O above the peak inspiratory pressure generated on a consistent basis.

Vti: Low Exhaled Tidal Volume shall be maintained at 50% of the tidal volume delivered or spontaneous tidal volume.

F: 5-45 breath/min (set 10 to 15 above patients ACTUAL respiratory rate)

etCO2: 30-50 mm hg

Apnea automatic activate after 15sec

Non-invasive Ventilation

Indication:

- 1. COPD
- 2. OSA-obstructive sleep apnea
- 3. Neuromuscular disorder
- 4. Cardiogenic pulmonary edema
- 5. Refuse intubation

Non-invasive Ventilation

Contra-indication:

- 1. No absolute contraindications
- 2. Incorrect mask size and type
- 3. Too much airway secretions
- 4. Inadequate Cough reflex
- 5. Emesis or high chance of aspiration patient

Non-invasive Ventilation

Warning:

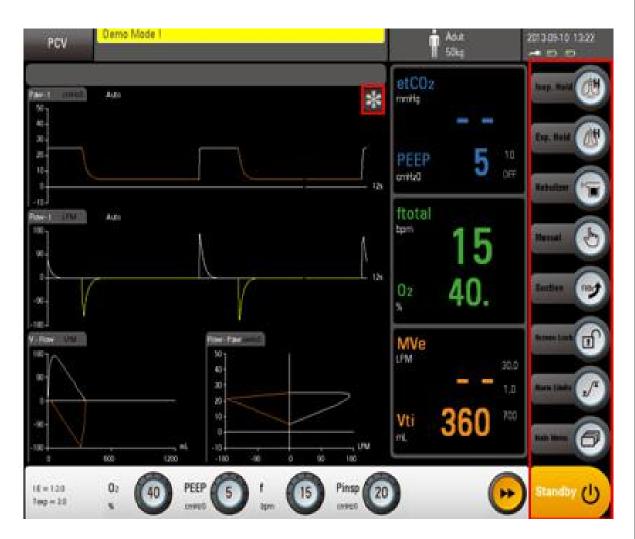
- 1. Pre-use education
- 2. Don't force silence breathing
- 3. Don't force mandatory breath
- 4. Minimize leakage

Enhancement

Inspiratory Hold Expiratory Hold Nebulizer Manual

Suction

Freeze



AEOMAED谊安 **Clinical perspective of learning**

Inspiration Hold

- Monitor Pplat
- Promote gas exchange
- Recruitment maneuvers
- Leakage testing

Application: All ventilation mode except SPONT、PSV、NIV/CPAP Duration: max 30S



Expiration Hold

Monitor PEEP

Application: All ventilation mode

Duration: max 30S



临床干预工具的使用

Nebulizer

- Humidifying airway
- Dilute sputum, promote cough reflex
- Prevent airway infection
- Relieve bronchial spasm

Application: All ventilation mode except NIV

Duration: max 30min





在通气回路中使用

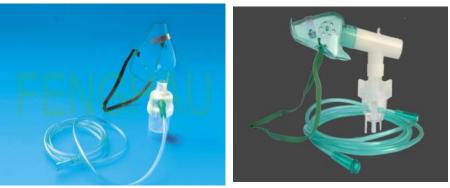
脱离呼吸机——配合面罩 或插管使用

临床干预工具的使用

Nebulizer

Warning:

- Connect nebulizer in between inspiration port and Y piece
- Apply filter to expiation port
- Never apply nebulizer in front of Y piece
- Remove HME



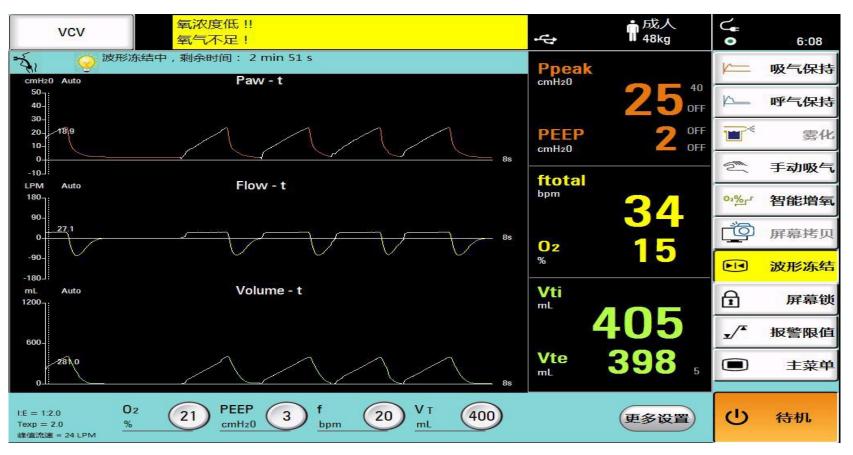


在通气回路中使用

式插管使用 或插管使用

Manual

Application : All ventilation mode



Suction

Application: In all ventilation mode

Process:

- ➤ 3mins 100% O2 prior suction
- 2mins Suction in-progress
- ➤ 2mins 100% O2 post suction



Suction (close system)

- For intubated patient require suction
- Fast and convenient
- Decrease workload
- No need to disconnect ventilator, decrease chances of infection

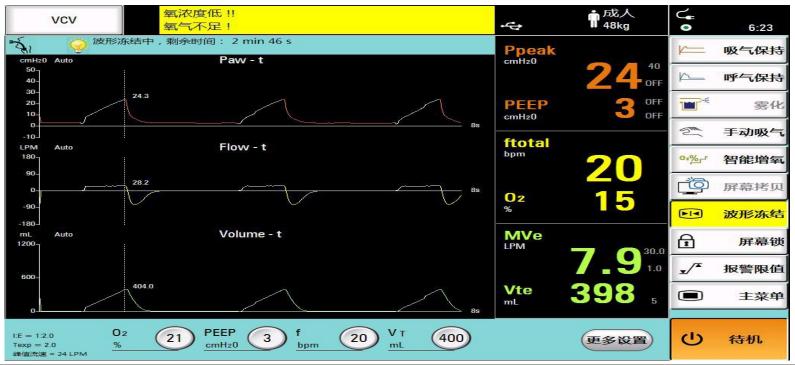


Waveform freeze

Application: All mode

Duration: 3mins max

- Monitor the value of every single point in the wave form
- Promote understanding of lung condition
- Combine with screen shot function, store real-time waveform



Screen shot

Plug USB, press button, to save waveform

SPONT/CPAP	氟浓度低! 氧气不足!		4		40	6:16	VCV	氟液酸蛋! 氧气不足!		4	1 ft2人 48kg	40	6.07	VCV		新治度(F 第二不足	11		4	11記人 45kg	¢ 6.09
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