Introduction to ventilation

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Learning outcomes:

- Why?
- Who

1. Modes
2. Monitoring
3. Alarms

SAFETY CHECKS

Why?

- Respiratory Failure (Adam, Osborne, Welch 2017)
  - ABG: PaO2 <8kpa pt. breathing air and at rest
  - PaCO2 >6kpa in the absence of a metabolic acidosis
  - +/- pH <7.25 in absence of a metabolic acidosis
  - Resp rate >40bpm or <6-8, deteriorating Vital capacity
- Type I respiratory failure – the problem is the lung parenchyma, low P_aO_2
- Type II pump failure the ventilation is inadequate therefore low P_aO_2, P_aCO_2

Who?

- Respiratory failure which is not corrected by other support (asthma, ARDS, pneumonia)
- Support of other failing organs
- Support of mechanical dysfunction (GBS, c-spine fractures, flail chest)
- High levels or sedation or aneasthesia / low GCS (<9)
- Therapeutic i.e to bring down ICP

How does MV work?

- Gas is driven through ET tube to deliver an air / oxygen mix under positive pressure
- Normal breathing is generated by negative pressure (air passively moves in after a space is created)

- Elimination of CO2 depends on the volume of air moved in and then out of the lungs

Mechanical Ventilation - MODES

- **Pressure Vs Volume**

  - **Pressure Mode** – Vent delivers gas until a predetermined pressure is achieved.

  - **Volume Mode** – Vent delivers gas until a predetermined volume is achieved.

  (RARELY USED)

Mechanical Ventilation - MODES

- **Spontaneous, Controlled & Intermittant.**

  - **Spontaneous** – all breaths 'triggered' by patient. ***(CPAP & Pressure Support)***

  - **Controlled (or Mandatory)** – Predetermined respiratory rate is set & delivered by vent. ***Overides any spontaneous effort from patient. (RARELY USED)***

  - **Intermittant** – vent synchronises to any spontaneous effort by patient thereby delivering both mandatory & spontaneous breaths. ***(PCV+, PSIMV)***

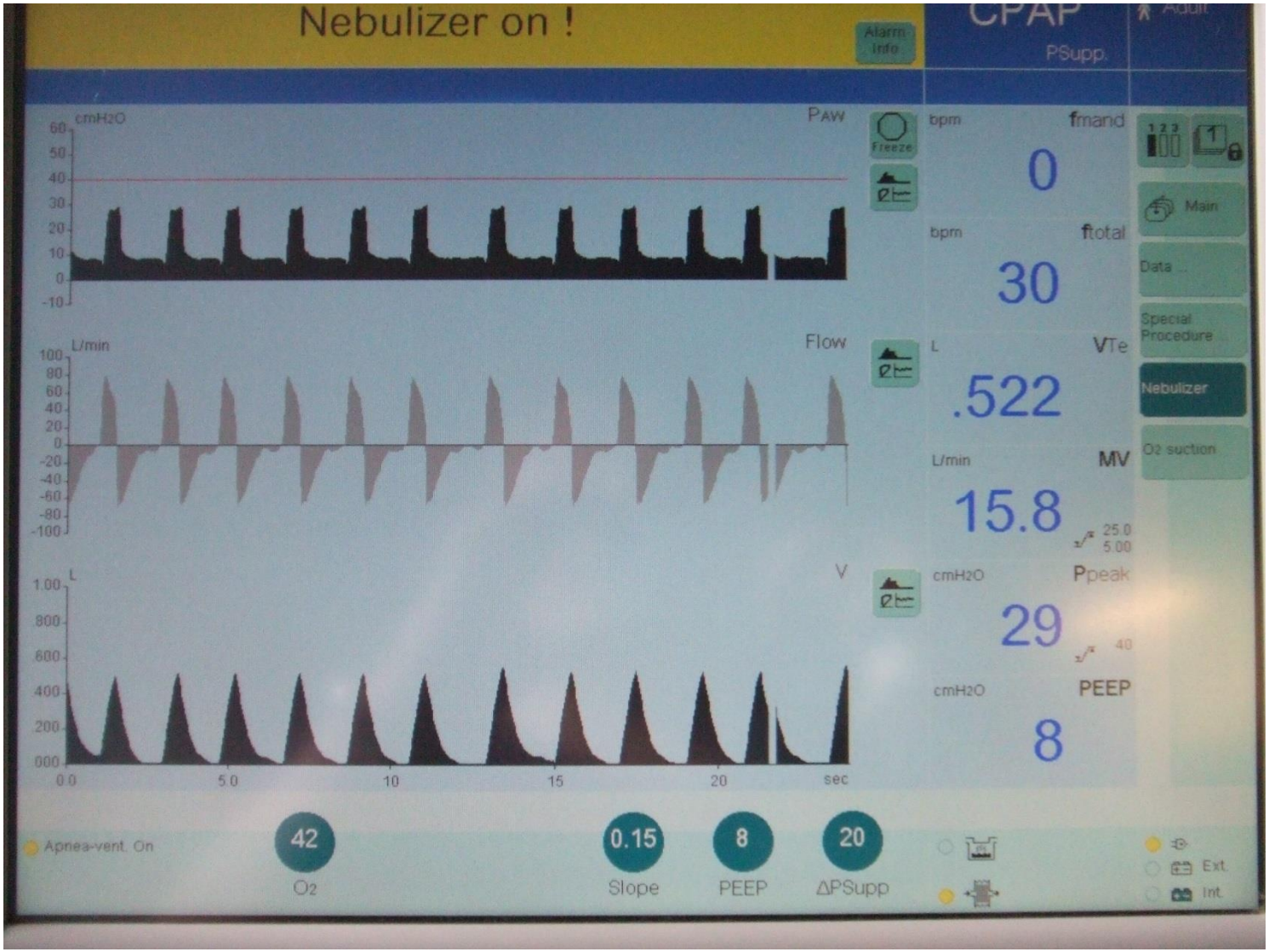
Settings – depends on the 'mode':

Pressure Support

- Pressure support
- FiO2
- CPAP

PCV+

- Pressure support (for patient triggered breaths)
- P insp (for breaths time cycled by vent, bpm)
- Rate
- Tinsp (inspiratory time)
- FiO2
- CPAP


Nebulizer on !
Alarm Info
CPAP
PSupp.
cmH2O
PAW
Freeze
bpm
fmand
0
bpm
ftotal
30
Main
Data ...
Special Procedure ...
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O2 suction
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Flow
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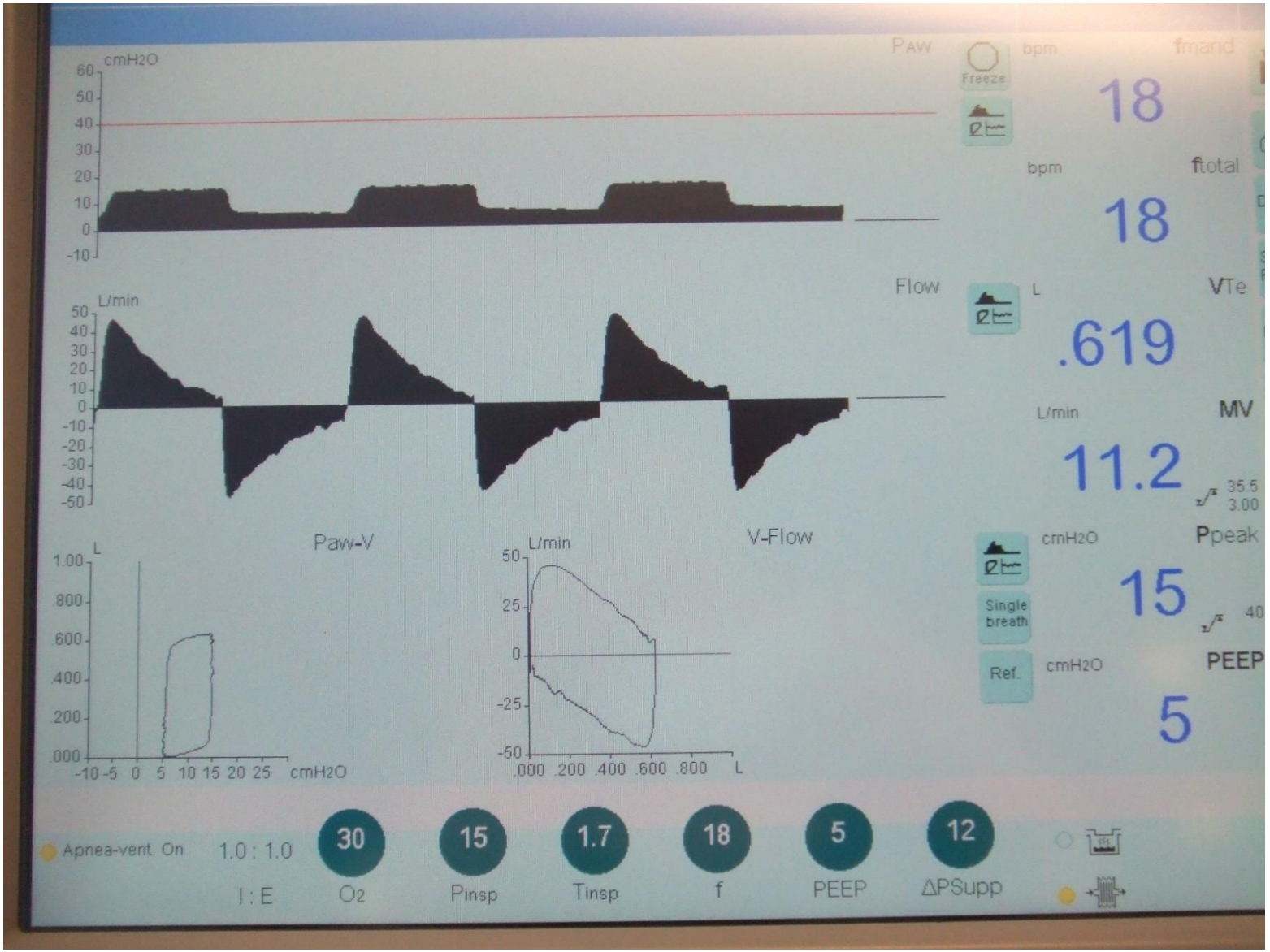
Paw
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ΔPSupp

Monitoring:

- F = Respiratory rate (total and patient triggered)

1. Fmand (number of set breaths)
2. F total (total number of breaths per minute)

- Vt – tidal volume
- MV - (minute volume)
- P peak (peak pressure reached on inspiration)
- PEEP
- I:E ratio (only if you set a respiratory rate)

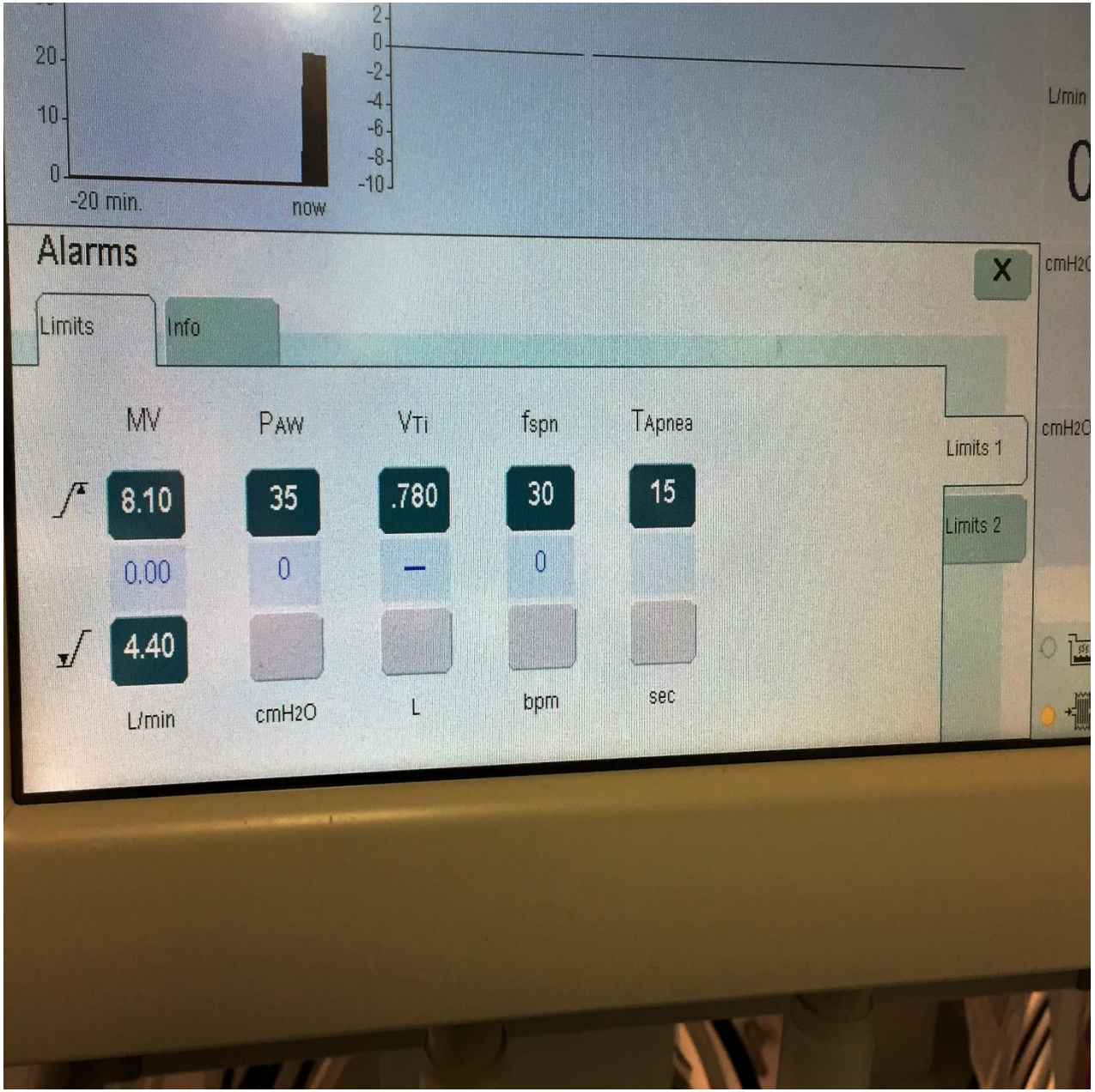
- *Also: SpO2, EtCO2, ABG, RR*
- *Chart sticker – mls / kg (normally 6ml/kg) of ideal body weight or predicted body weight.*

ALARMS:

- VT (tidal volume)
- MV (minute volume)
- Pressure (peak) – unless you have a good reason make sure this does not go above 30mmHg
- Respiratory rate (check current rate from chart)
- Apnea time (normally 15 seconds or RR=4)

➢ Don't switch this off – only very exceptional circumstances i.e speaking valve with trachy, you must be present

- Look at patients current values and check with someone if you are not sure.


20
10
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-20 min.
now
2
0
-2
-4
-6
-8
-10
L/min
Alarms
X
Limits
Info
MV
PAW
VTi
fspn
TApnea
8.10
35
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30
15
0.00
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—
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4.40
L/min
cmH2O
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bpm
sec
Limits 1
Limits 2
cmH2O
cmH2O

Challenges in patient care:

- Decreased Cardiac output and venous return
- Barotrauma
- Communication difficulties
- Psychological problems (pain, agitation, delirium)
- Nutritional problems
- Infection risks
- Sputum clearance and airway management / physio

Safety checks:

- Mapleson C circuit – attached, checked ready to go, long enough
- Face mask and angle piece, catheter mount, spare HME
- Suction checked working – if attached to closed suction circuit set at 20kpa ensure canister is not full
- Alarm limits are set on monitor and ventilator
- Patient assessment – auscultate so you have a baseline
- Cuff Pressure