

# PACING

## ENSURE A VALID INDICATION

- symptomatic bradycardia

## CONSIDER ISOPRENALINE INFUSION

## ADEQUATE SEDATION IF CONSCIOUS

## SWITCH ON DEFIBRILLATOR

## PLACE EXTERNAL PADS

## AP OVER L STERNUM AND L SPINE

## PACING MODE

START AT 60 mA

RATE OF 80 bpm

SET AT >10% ABOVE CAPTURE mA

## Consider alternatives & adjuncts

eg: Isoprenaline Infusion  
Glucagon in beta-blocker OD

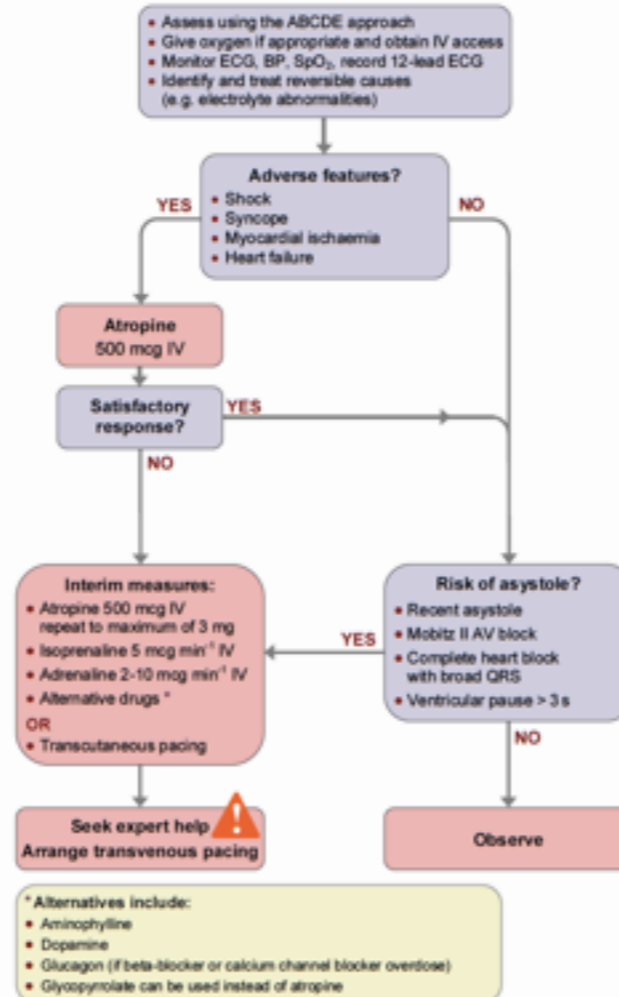
## SEEK EXPERT HELP

# BRADYCARDIA

2010 Resuscitation Guidelines

Resuscitation Council (UK)

## Adult bradycardia algorithm



See over for PACING

# TACHYCARDIA

## MEDICATIONS

See expert help if uncertain

**AMIODARONE** 300 mg IV over 10-20 mins then infusion of 900 mg over 24 hrs

Syringe Driver - Amiodarone 600mg / 50ml (12 mg/ml)

Use amiodarone 300 mg in 3 ml ampules  
Dilute 600 mg (4 x 3 ml = 12 ml) up to 50 ml with 5% Dextrose NOT NORMAL SALINE  
In an emergency can give 150-300 mg over 1-2 minutes, otherwise commence with a loading dose of 5 mg/kg over 20 minutes  
Then follow with an infusion of 0.4-0.7 mg/kg/hr over 24 hrs

50 ml syringe	70kg ADULT	DOSE RANGE	RATE OF INFUSION (Syringe Driver)
Loading Dose	350 mg (29 ml)	87 ml/hr for 20 mins only	
Maintenance	28 - 50 mg/hr	2.3 - 4.2 ml/hr	

**ADENOSINE** : 6 mg - 12 mg - 18 mg via fast IV'

**METOPROLOL** : 5mg aliquots IV

**ESMOLOL** : at a dose of 0.5mg/kg  
100mg/ml dilute in 10ml = 10mg/ml  
100kg = 50mg = 5ml

**DIGOXIN** : load 125mcg - 500mcg as appropriate

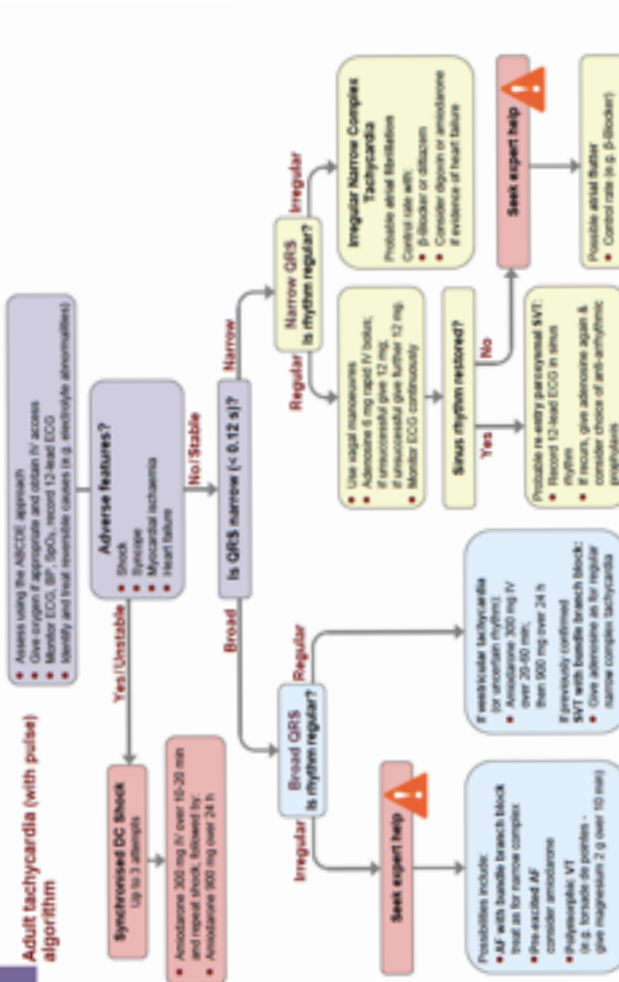
**DILTIAZEM** : 0.25 mg/kg IV for SVT

**MAGNESIUM** : 2g over 20 mins

# TACHYCARDIA

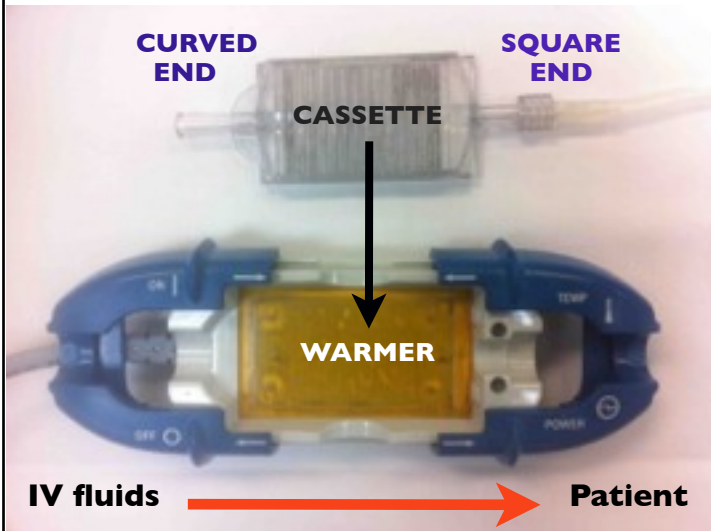
Resuscitation Council (UK)

2010 Resuscitation Guidelines



see over for meds

# EnFlo Fluid Warmer



Attach **POWER PACK** to **IV POLE**

Plug in to **MAINS ELECTRICITY**

Connect **WARMER** to the **POWER PACK**

Connect **IV CASSETTE** to **FLUIDS (upstream)** &  
run a short IV extension to **PATIENT (downstream)**

Place **IV CASSETTE** into **WARMER**  
- the square end is to patient

**TURN ON** at **POWER PACK**

Can run wide open or control via pump set

**Make sure the WARMER and CASSETTE are  
not touching patient and are always visible  
- they can cause burns!**

## Oxylog 2000 plus

### START in VC-CMV

Can set the following as default for typical **adult** when **OFF**

Set **TIDAL VOLUME** (typically **5-7 ml/kg**)

Set **RESPIRATORY RATE** eg: **12**

Set **Pmax** eg : **50 cmH2O**

Set **FiO2** (air/O2 mix ~ 40% or **100% O2**)

Will start in **VC-CMV mode** (check is selected)

Select **TRIGGER MODE** - typically OFF for paralysed patient. If patient can make some resp effort, select a trigger value of 3-15 l/min to enable VC-AC mode

Select **PEEP VALUE 5-10 cm H2O** (default 5 cm H2O)

Select **I:E ratio** (range 1:4 to 3:1)

Select **Tplat**

Once ventilating, re-assess Pmax (Paw window) and reduce Pmax value as appropriate, as well as TV and RR etc

Adjust **ALARM parameters** as appropriate (inc. RESET)

**IF PATIENT IS ABLE TO BREATHE, ALBEIT IRREGULARLY, SWITCH TO VC-SIMV MODE**

**(SEE OVER for VC-SIMV)**

## Oxylog 2000 plus

### VC-SIMV

For patients with inadequate spontaneous breathing, or for patients who are to be weaned gradually. Fixed mandatory minute volume MV is set with tidal volume VT and ventilation respiratory rate RR. The patient can breathe spontaneously between the mandatory ventilation strokes and thus contribute to the total minute volume. Spontaneous breathing can be assisted with PS.

Set the ventilation pattern with the controls below the display:

- Tidal volume VT.
- Respiratory Rate RR.
- Maximum airway pressure Pmax.
- O2 setting FiO2.
- Inspiration time Ti.
- Plateau time Tplat %, in % of the inspiration time.
- Positive end expiratory pressure PEEP
- Sensitivity Trigger.

### Pressure support (optional)

The following can also be set on the display for VC-SIMV / PS:

- Setting on page 1: Pressure support  $\Delta P_{supp}$  above PEEP.
- Setting on page 2: Pressure rise time slope

flat ramp	=	long pressure rise time
medium ramp	=	medium pressure rise time
steep ramp	=	short pressure rise time.

# Transfer ABCs

A - Airway	Intubated on arrival for GCS 5 (M3VIEI) - RSI - grade I view. Airway now patent, protected with size 8.5 ETT tube 22cm teeth and tied. Cervical collar in situ.
B - Breathing	Paralysed with vecuronium and on volume control TV 600 RR 12 R sided HTX and a 34 Fr intercostal catheter in place, drained 400ml blood. SpO2 now 96%
C - Circulation	Haemodynamically stable after 750ml crystalloid titrated to radial pulse in 250ml aliquots (permissive hypotension). HR 90 BP 74/50 Bleeding likely from HTX, abdomen and pelvis.
D - Disability/ Drugs	M3VIEI PEARLA initially, now MIVTEI on propofol/vecuronium infusion.
E - Exposure	R HTX drained as above. Abdomen tense and tender in LUQ, suspect splenic injury. No other injuries on log roll, pelvic binder applied. Warm blankets and Bair hugger
F - Fluids	3 x 250ml crystalloid aliquots titrated to radial pulse (SBP 70) IDC in situ and drained 300ml clear urine
G - Gut	Last ate 7pm. NG passed and on free drainage.
H - Haem	Hb 114 on iStat, INR 1.0 No ACoTs.
I - Infusions	Not needed vasopressors On propofol and vecuronium infusions for transport
J - JVP	Not elevated - no signs tPTX/tamponade.
K - Kelvin	Temp is 36 degrees with active warming
L - Lines	14G IV R wrist 8Fr rapid infuser L ACF
M - Micro	Has been given ADT
N - Notes/ NOK	His notes are in this envelope, including copies of plain X-rays NOK are aware and here are their contact details.

# ASTHMA in ED

## Management of Life-Threatening Asthma in the Emergency Department

**Step One**

1. Continue nebulised albuterol	Use oxygen for nebulisation not room air 8 litres per minute Nebuliser will need to be refilled every 10-15 min Dose is not important, keep making smokes	Consider the differential COPD Pneumothorax ACS Aortic dissection Pulmonary embolism Allergic rhinitis / Foreign body Painful ear/nose
2. Nebulised ipratropium bromide	800-mcg, added to albuterol q30 min x 3, then q1h	
3. Methylprednisolone 120 mg (1.5 mg/kg) IV	Alternative: Dexamethasone 20 mg IM or IV	
4. Magnesium sulfate 2 g (20 mg/kg, max 2 g) IV	Give over 20 minutes	

IF NO IMPROVEMENT

**Step Two**

1. Epinephrine 0.5 mg (1.1 mg/kg, max 6.0 mg) IM	Proper concentration of epi for IM injection is 1:1000 (1 mg in 1 mL), so 0.5 mg = 0.5 mL. May repeat q15 min, or start IV drip at 0.1 mcg/min and titrate to effect Alternative to epi: Terbutaline 10 mg/kg IV bolus over 10 min, then 0.1 mg/kg/min
2. Fluid bolus 20 cc/kg normal saline	
3. Diagnostics: Chest X-ray, CBC, electrolytes, venous blood gas, HCG, ECG if concern for non-sinus rhythm or cardiac ischemia	

IF NO IMPROVEMENT

**Agitated Patient**

Ketamine 1.5 mg/kg IV over 30 seconds, then 1 mg/kg/hour  
Titrate drip to effect  
If no IV: 0.5 mg/kg IM

IF WORSENING

Non-invasive Ventilation  
Inspiratory support / EPAP / PEEP: 8 cm H2O  
Expiratory support / EPAP / PEEP: 8 cm H2O  
Continue nebulizer treatments through NIV

IF WORSENING

NO

→

YES

**Cooperative Patient**

Non-invasive Ventilation  
Inspiratory support / EPAP / PEEP: 8 cm H2O  
Expiratory support / EPAP / PEEP: 8 cm H2O  
Continue nebulizer treatments through NIV

IF WORSENING

Ketamine 1.5 mg/kg IV over 30 seconds, then 1 mg/kg/hour  
Titrate drip to effect  
If no IV: 0.5 mg/kg IM

IF WORSENING

**Step Three**

**AVOID INTUBATION IF POSSIBLE**

**Intubation and Ventilation of the Asthmatic**

<p><b>Indications</b></p> <ul style="list-style-type: none"> <li>Progressive fatigue / respiratory failure</li> <li>Progressive deterioration of mental status</li> <li>Cardiac arrest</li> </ul> <p><b>Tachyphexia</b></p> <ul style="list-style-type: none"> <li>Maximize preoxygenation</li> <li>Optimize for first pass success</li> <li>Inflate while patient is upright</li> <li>Use largest ETT possible</li> <li>Be mindful of tendency to bag-mask ventilate too aggressively, this leads to breath stacking</li> </ul> <p><b>ETT Size</b></p> <ul style="list-style-type: none"> <li>Ketamine 2 mg/kg + Rocuronium 1.2 mg/kg or Succinylcholine 2 mg/kg</li> </ul>	<p><b>Initial Vent Settings</b></p> <ul style="list-style-type: none"> <li>Assist control / Volume control</li> <li>Respiratory rate 8 breaths/min</li> <li>Total volume 7 mL/kg IBW</li> <li>PEEP 2 cm H2O</li> <li>Inspiratory flow: 90 lpm (or 1:1.5)</li> <li>FiO2 100%</li> </ul> <p>Plateau pressure is measured by using the inspiratory pause function and noting airway pressure during the inspiratory hold</p>	<p><b>Vent Management</b></p> <ul style="list-style-type: none"> <li>Goal is plateau pressure &lt; 30 cm H2O</li> <li>8 Pplat for high, decrease rate, then tidal volume</li> <li>Continue nebulised albuterol</li> <li>Paralyze if needed, deep sedation/analgesia preferred</li> <li>External chest compression to assist exhalation</li> <li>Can accept high pCO2 for several hours (goal &lt; 7.10)</li> <li>Aggressive airway suctioning</li> <li>Frequent electrolyte checks, watch for hypokalemia</li> <li>Consider inhalational anesthetic, fentanyl</li> </ul> <p><b>If Patient Cannots on Vent DISCONNECT VENTILATOR</b></p> <ul style="list-style-type: none"> <li>External chest compression to assist exhalation</li> <li>Bag-mask ventilation - do not overventilate</li> <li>Verify that ETT not displaced / plugged / kinked</li> <li>Monitor hemodynamics</li> <li>Check RSI, oxygenation</li> <li>Consider ECMO/press</li> </ul>
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## IF YOU HAVE TO INTUBATE

Maximise preoxygenation - Optimise first pass success  
Largest ETT possible - Beware breath stacking  
Ketamine 2mg/kg IV  
Rocuronium 1.2 mg/kg or Sux 2mg/kg IV  
Assist control / Volume control  
RR 8 TV 5-7 ml/kg IBW  
PEEP 2cm H2O IE 1:5 FiO2 100%

permissive hypercarbia  
Ext chest compression  
Pplat < 30cm H2O  
Aggressive suctioning, check K

# Oxylog 2000 plus



## Continuous Positive Airway Pressure

Set up as per usual ie :TV/RR/Pmax/FiO2 - **SELECT SpnCPAP** mode

The following can additionally be set on the display for SpnCPAP / PS :

- Pressure support  $\Delta P_{supp}$  above PEEP.
- Sensitivity Trigger (for synchronization with patient's spontaneous breathing efforts). Successful patient triggering is briefly indicated by an asterisk(\*) in the middle of the status alarm messages

Apnea back-up ventilation is only applicable when using the SpnCPAP mode. In the event of an apnea, the ventilator will automatically activate volume controlled mandatory ventilation (VC-CMV).

### SELECT SETTING FOR APNEA VENTILATION

- 1 Press the Settings key until page 2/3 appears.
- 2 Set Tapn with the rotary knob to a value between 15 and 60 sec.
- 3 Set RRapn and VTapn.
- 4 Set Pmax. This determines the maximum airway pressure allowed during apnea ventilation.

To switch apnea ventilation OFF

- Set Tapn to OFF (see setting apnea ventilation above)

To end apnea ventilation

- Press the Alarm Reset key.

The ventilation time ratio I:E = 1:1.5 and the plateau time  $T_{plat} \% = 0$  are preset during apnea ventilation.

# Oxylog 2000 plus



## CONSIDER ALSO

Ensure **adequate mask seal**  
(use the Draeger mask size guide)

Use **Clausen harness**

Draw **ABGs** and re-assess regularly

If tiring, consider '*do I need to intubate?*'

**If combative, consider sedation & DELAYED SEQUENCE INTUBATION**

# ADULT BIG



**ADULT  
Resus Trolley**

Locate TIBIAL  
TUBEROSITY  
2 cm medial,  
1 cm superior  
into TIBIAL PLATEAU



Hold flat at 90° to skin - remove safety latch  
Fingers under wings - Apply pressure with palm  
BIG will ACTIVATE  
remove trocar and secure (can use the safety latch)

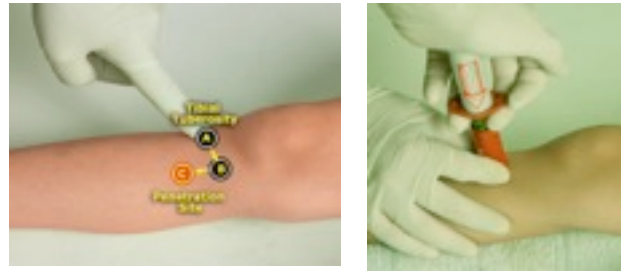
## **USE PRESSURE BAG TO INFUSE**

Prime with 1-2 mls of 2% lignocaine



**PAEDIATRIC  
Resus Trolley**

Locate TIBIAL  
TUBEROSITY  
1-2 cm medial,  
1-2 inferior  
into TIBIAL PLATEAU



Adjust the penetration depth according to age :

0-3 years	0.5 - 1.0 cm
3-6 years	1.0 - 1.5 cm
6-12 years	1.5 cm

## **USE SYRINGE & 3-WAY TAP TO INFUSE**

Prime with < 0.5mg/kg lignocaine (1% = 10mg/ml)

# C SPINE RULES

NEXUS

**Any of the following?**

Intoxicated?  
not AOX3  
neuro deficit  
extremity paraesthesia  
distracting injury



**IMAGING**



**Midline tenderness?**



**Able to rotate neck  
45 degrees?**



**CLEAR**



**IMAGING**

**Age 16-65  
and any  
LOW RISK  
criteria?**  
simple rear  
end  
sitting in ED  
ambulatory at  
any time  
delayed onset  
neck  
and no  
DANGEROUS  
MECHANISM  
(see over)

Canadian

# C SPINE RULES

Dangerous Mechanism: fall from >3 ft or 5 stairs, an axial load to head, high speed (>60 mph) MVC, Rollover or Ejection MVC, Recreational Vehicle Collision, or Bicycle Collision.

Painful Distracting Injury: Including, but not limited to long bone fracture, visceral injury requiring surgical consultation, large laceration, degloving injury, crush injury, large burns, or any injury causing acute functional impairment.

Midline Tenderness: in a 2cm band anywhere from occiput to T1

Simple rear-end collision does not include: being pushed into oncoming traffic, being hit by a bus or large truck, rollover, being hit by a high-speed vehicle

Neck rotation: able to rotate neck 45° regardless of pain

CCR vs. Nexus: NEJM 349:26, Dec 25, 2003. Nexus : Annals EM 1992;21:1454-60. CCR :JAMA 2001;286:1841

This doesn't constitute a recommendation or a usable guideline. Make your own decisions based on your evidential interpretation. If you pith your patient, do not blame me. **LOW THRESHOLD FOR TRANSFER & CT / MRI**



# ASTHMA in ED

## STEP ONE

Continuous nebulised salbutamol  
Nebulised ipratropium bromide  
Methylprednisolone 125mg (1.5 mg/kg) IV  
MgSO<sub>4</sub> 2g (50mg/kg max 2g) IV

*if no improvement*

## STEP TWO

Adrenaline 0.5mg IM (0.01mg/kg) = 0.5ml 1:1000  
Fluid bolus 20 ml/kg  
CXR, ECG, VBG, Electrolytes, FBC

*if no improvement consider NIV*

### AGITATED PATIENT

ketamine 1.5 mg/kg IV  
over 30 secs  
then 1 mg/kg/hr titrate to  
effect  
if no IV, 5mg/kg IM

IF WORSENING  
NIPPV  
iPAP PS 8cm H<sub>2</sub>O  
ePAP PEEP 3 cm H<sub>2</sub>O  
continue nebuliser  
through NIPPV

### COOPERATIVE PATIENT

NIPPV  
iPAP PS 8cm H<sub>2</sub>O  
ePAP PEEP 3 cm H<sub>2</sub>O  
continue nebuliser  
through NIPPV

IF WORSENING  
ketamine 1.5 mg/kg IV  
over 30 secs  
then 1 mg/kg/hr titrate to  
effect  
if no IV, 5mg/kg IM

### Consider the differentials

*heart failure, ACS, arrhythmia, pulmonary embolism  
TENSION PTX, pericardial tamponade, obstruction,  
foreign body, anaphylaxis*

**AVOID INTUBATION IF POSSIBLE**

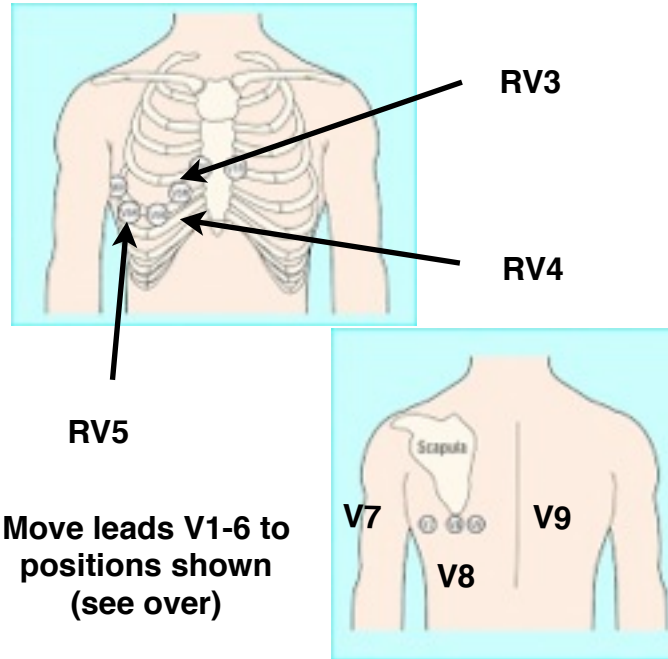
**SEE OVER FOR EMERGENCY  
INTUBATION AND  
VENTILATOR SETTINGS**

## RV - Posterior ECG

- RV3 halfway between V1 & V4R (use V1 lead and re-label)
- RV4 right side 5th intercostal space, mid-clavicular line (use V2 lead and re-label)
- RV5 same level as V4R on right anterior axillary line (use V3 lead and re-label)
- V7 same horizontal line as V4 on posterior axillary line (use V4 lead and re-label)
- V8 same horizontal line as V4 below midpoint of scapula (use V5 lead and re-label)
- V9 same horizontal axis as V4-V8 paraspinal region (use V6 lead and re-label)

**don't forget to re-label the ECG!**

## RV - Posterior ECG



**Move leads V1-6 to positions shown (see over)**

**don't forget to re-label the ECG!**