



Clinical Practice Procedures: Cardiac/Transcutaneous cardiac pacing

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Date	December, 2024
Purpose	To ensure a consistent procedural approach to transcutaneous cardiac pacing.
Scope	Applies to Queensland Ambulance Service (QAS) clinical staff.
Health care setting	Pre-hospital assessment and treatment.
Population	Applies to all ages unless stated otherwise.
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Transcutaneous cardiac pacing

December, 2024

Transcutaneous cardiac pacing (TCP) works as an artificial pacemaker, delivering repetitive electrical currents when the natural pacemaker has become blocked or dysfunctional.

TCP is often beneficial for patients with symptomatic bradycardia, especially if the patient is unresponsive to atropine.^[1-3]

To have effect, the myocardium must be capable of generating cardiac output with the muscular contractions.

There are two modes of TCP:

- demand pacing
- non-demand/asynchronous pacing^[4]

Demand pacing is designed to sense the inherent QRS complex, delivering electrical stimuli only when needed. Demand pacing is the preferred mode of pacing for QAS clinicians and devices should be set to this mode.

Indications

- Symptomatic bradycardia (HR < 60)

Contraindications

TCP is contraindicated within the QAS for:

- Asystole/PEA
- Overdrive pacing of a ventricular dysrhythmia.

Complications

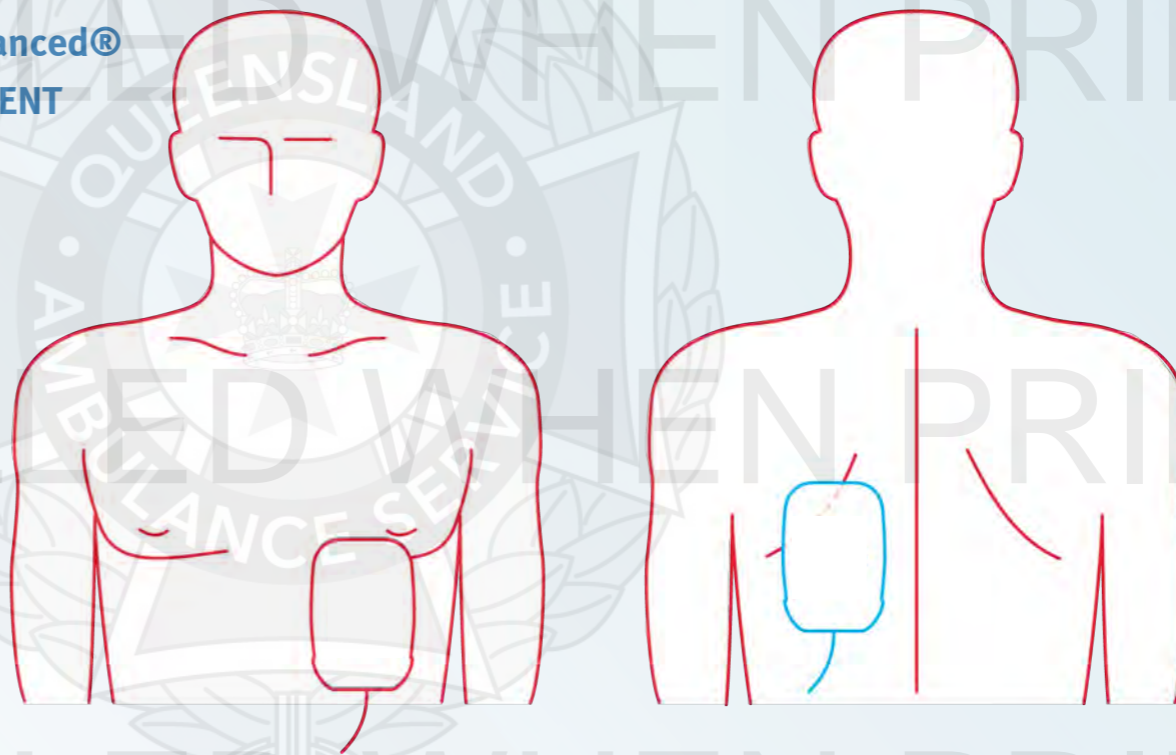
- Pain
- Discomfort
- Anxiety
- Failure to achieve electrical capture

Procedure – Transcutaneous pacing

1. Explain the procedure to the patient (cutaneous nerve stimulation and/or skeletal muscle contraction).
2. Establish IV access with a sodium chloride 0.9% running line.
3. Ensure adequate oxygenation, ventilation and basic cares are completed.
4. Position ECG electrodes. (refer to *CPP: Cardiac monitoring*)
5. Position defibrillation electrodes in the anterior-posterior position (all patient ages).
6. Anterior-lateral electrode placement may be considered if anterior-posterior placement is not possible.

Corpuls³, ZOLL X Series® and X Series Advanced® ANTERIOR-POSTERIOR ELECTRODE PLACEMENT

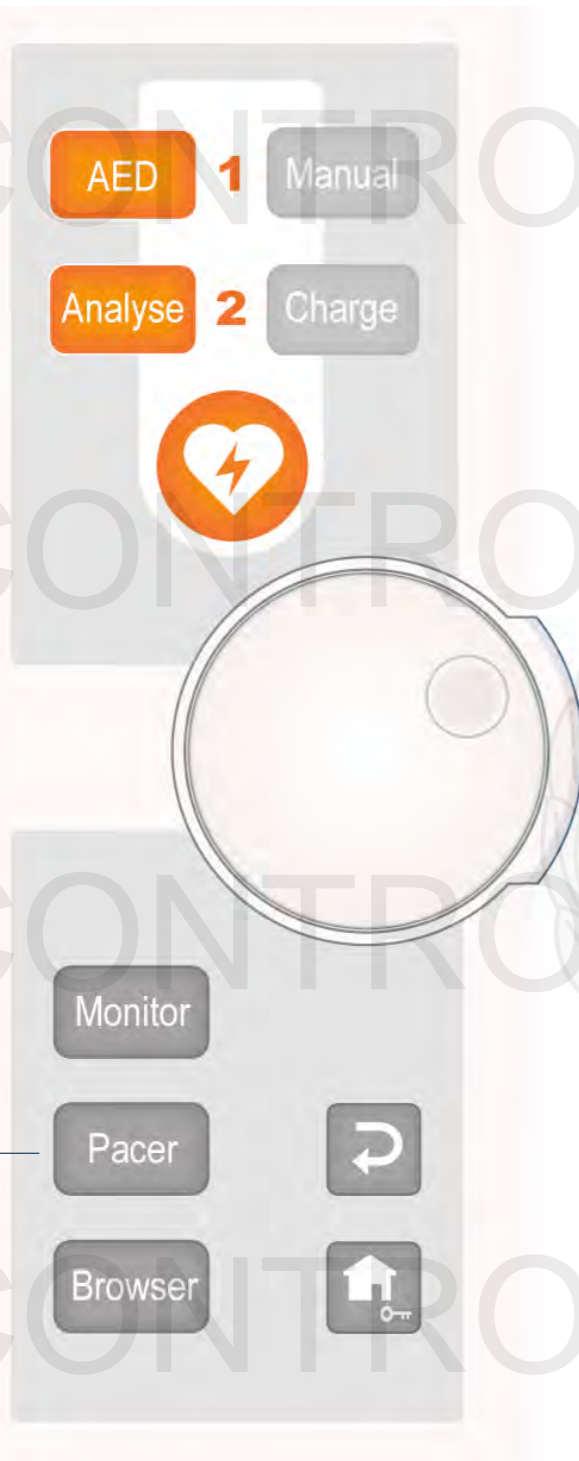
- **Positive defibrillation electrode:**
position electrode on the patient's chest at the level of the bottom third of the sternum (between 4th and 5th ICS).
- **Negative defibrillation electrode:**
position electrode on the patient's back beside the vertebral column beneath the shoulder blade.



Positive defibrillation electrode

Negative defibrillation electrode

7. Consider appropriate analgesia and sedation (refer to *CPG: Pain management* and/or *CPP: Sedation – procedural*).



corpuls³: For comprehensive instructions refer to the corpuls³ operating instructions.

1. Press the **Pacer key** to turn the pacer on.
2. Confirm that 'demand' is displayed on the screen. If not, press the **Mode key**, followed by the **Demand key**.
3. Press **Freq.** (Frequency) key, if necessary rotate jog (default setting is 70 bpm). The jog will change the frequency in increments of 5 bpm.
4. Press the **Intens.** (Intensity) key.
5. Increase the intensity incrementally by rotating the jog while observing the patient and assessing for electrical and mechanical capture. The jog will change the intensity in increments of 5 mA.

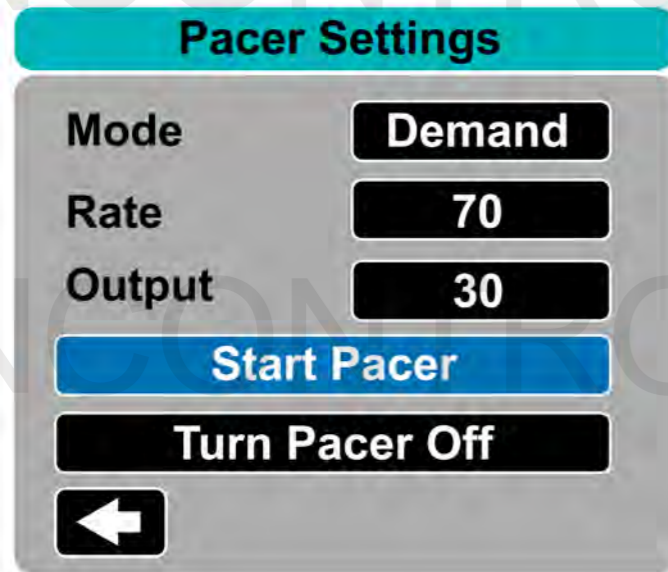
Please note: *pacing will begin automatically as soon as intensity of > 0 mA is selected.*



Procedure – Transcutaneous pacing

ZOLL X Series® and X Series Advanced®: For comprehensive instructions refer to the ZOLL X Series® or X Series Advanced® operating instructions.

1. Press the **Pacer** button on the front panel to display pacer settings.



2. Use the arrow keys to navigate to **Rate**, press the **Select** button to set the **Pace Rate**.
3. Use the arrow keys to navigate to **Start Pacer**, press **Select** button to turn on. The Pacing window displays behind the Pacer Settings window.



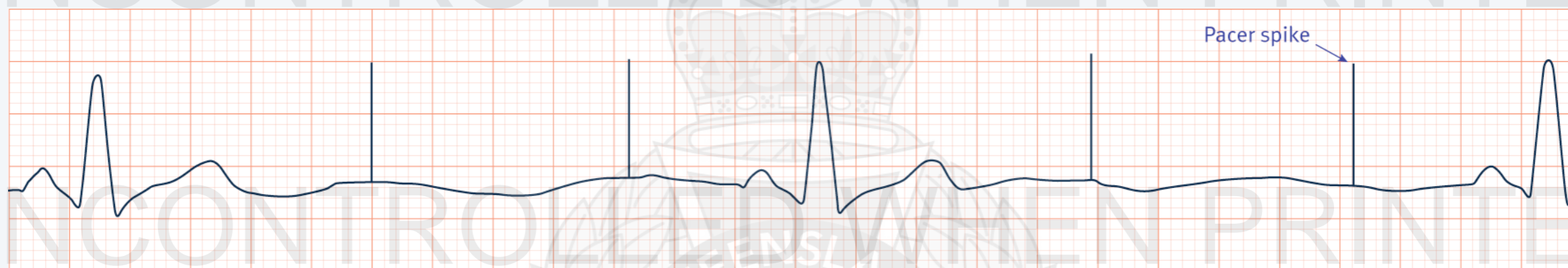
4. In the Pacer Settings window, use the arrow keys and the **Select** button to adjust the pacer output while observing the patient and assessing for electrical and mechanical capture. Current is adjustable in 10 mA increments when increasing the output, and in 5 mA when decreasing.



+ Additional information

- There is not evidence to support routine pacing in cardiac arrest.
- The most common error in TCP is failure to advance the current high enough to achieve electrical capture (*see figure A*).^[1]

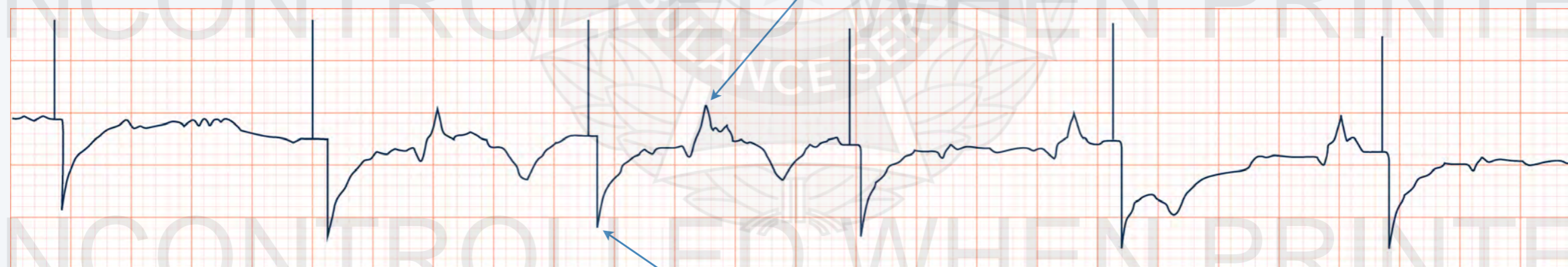
FIGURE A: No electrical capture, insufficient pacing current.



x1.0 25mm/sec DEMAND: 70 ppm 80 mA

- Insufficient pacing current may also produce ECG signal distortion which can be mistaken for electrical capture (*see figure B*).

FIGURE B: False electrical capture, insufficient pacing current.



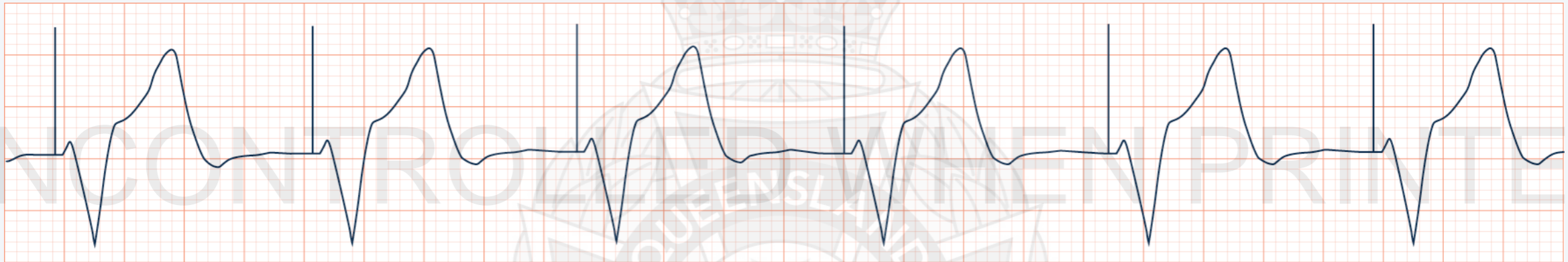
x1.0 25mm/sec DEMAND: 70 ppm 100 mA

ECG signal distortion can be mistaken for electrical capture

Additional information

- In conscious patients begin with the pacing current set to zero mA and increase the mA until electrical capture is identified.
- Electrical capture is evidenced when the pacer spike is immediately followed by a wide QRS complex and a broad, tall T-wave and suppression of the patient's 'native' QRS complexes (see figure C).^[1]

FIGURE C: Electrical capture indicated by broad QRS AND T-wave following the pacer spike and 'native' QRS complexes are suppressed.



x1.0 25mm/sec DEMAND: 70 ppm 130 mA

- The minimum current effective to obtain reliable mechanical capture should be used to minimise heart damage and patient discomfort. Reassess patient regularly to ensure mechanical capture is maintained.
- If the patient becomes intolerant of the procedure, consider further analgesia/sedation.
- In unconscious patients increase the current quickly to the maximum and adjust downward to the threshold when electrical capture is obtained.
- Check for signs of mechanical capture evidenced by presence of a pulse and signs of improved cardiac output. Both electrical and mechanical capture must occur for pacing to be successful.
- Common causes of failure to improve cardiac output despite electrical capture include hypoxia, acidosis, and physiological variables.
- TCP thresholds may change during pacing and loss of capture may result. Patients should never be left unattended during TCP.