Clinical Practice Procedures:
Cardiac/12-Lead ECG acquisition

<table>
<thead>
<tr>
<th>Policy code</th>
<th>CPP_CA_12L_0619</th>
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<tbody>
<tr>
<td>Date</td>
<td>June, 2019</td>
</tr>
<tr>
<td>Purpose</td>
<td>To ensure a consistent procedural approach to 12-lead ECG acquisition.</td>
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<tr>
<td>Scope</td>
<td>Applies to Queensland Ambulance Service (QAS) clinical staff.</td>
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<tr>
<td>Health care setting</td>
<td>Pre-hospital assessment and treatment.</td>
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<tr>
<td>Population</td>
<td>Applies to all ages unless stated otherwise.</td>
</tr>
<tr>
<td>Source of funding</td>
<td>Internal – 100%</td>
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<tr>
<td>Author</td>
<td>Clinical Quality &amp; Patient Safety Unit, QAS</td>
</tr>
<tr>
<td>Review date</td>
<td>June, 2022</td>
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The **12-Lead electrocardiogram (ECG)** is a graphical representation of the electrical activity within the heart. It provides information on the pacemaker origin, rate, axis and conduction pathways of the myocardium. Further interpretation of the 12-Lead ECG can indicate AMI, ischaemic changes, electrolyte imbalances, conduction defects, drug toxicity, dysrhythmias and some structural changes.

Timely acquisition of a 12-Lead ECG is warranted for all patients suffering signs/symptoms suggestive of AMI (e.g. chest pain/tightness). Additionally, clinicians should have a low threshold for obtaining 12-lead ECGs in the following circumstances:

- ALOC
- Overdose
- Envenomation
- Electrolyte disorders
- Syncope
- Patients presenting with grossly altered vital signs

### Indications

- Any patient requiring detailed ECG analysis:
  - suspected ACS
  - cardiac dysrhythmias
  - conduction disturbances
  - electrolyte imbalances
  - drug toxicity

### Contraindications

- Nil in this setting

### Complications

- Nil in this setting
Procedure – 12 Lead ECG acquisition

1. Explain to the patient what is required, ensure privacy and obtain consent to place electrodes.
2. If required, remove excessive hair to ensure electrodes have full contact with the patient’s skin.
3. Clean and dry the skin.
4. Position the patient preferably supine or semi-recumbent, (without arms or legs crossed).
5. Attach electrodes to the connector on each lead, ensuring electrodes are in date and gel is moist.
6. Accurately position the electrodes on the patient. (refer to CPP: Cardiac Monitoring)
7. Accurately position the chest electrodes on the patient.

### Placement of ECG Chest Electrodes

<table>
<thead>
<tr>
<th>Placement order</th>
<th>Chest lead</th>
<th>Anatomical position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>V1</td>
<td>4th Intercostal space, right of the sternum</td>
</tr>
<tr>
<td>2nd</td>
<td>V2</td>
<td>4th Intercostal space, left of the sternum</td>
</tr>
<tr>
<td>3rd</td>
<td>V4</td>
<td>5th Intercostal space, on left midclavicular line</td>
</tr>
<tr>
<td>4th</td>
<td>V6</td>
<td>On the left mid-axillary line, level with V4</td>
</tr>
<tr>
<td>5th</td>
<td>V3</td>
<td>Midway between V2 and V4</td>
</tr>
<tr>
<td>6th</td>
<td>V5</td>
<td>Midway between V4 and V6</td>
</tr>
<tr>
<td>Optional*</td>
<td>V4R</td>
<td>5th Intercostal space, on the right midclavicular line</td>
</tr>
</tbody>
</table>

* For evaluation of right ventricular involvement with inferior STEMI. Consider acquiring a 12-Lead ECG with V4 repositioned to V4R. If V4R is acquired, the 12-Lead ECG must be annotated to indicate that V4 is now representing V4R. Furthermore when V4R is acquired, the defibrillators interpretive statement is not to be relied upon.[1]
Procedure – 12 Lead ECG acquisition

corpuls\textsuperscript{3}: For comprehensive instructions refer to the corpuls\textsuperscript{3} operating instructions

1. Ensure the corpuls\textsuperscript{3} is on.
2. Press the Monitor key.
3. Press the D-ECG soft-key.
4. Encourage the patient to remain as still as possible.
5. Ensure that all leads are displayed and that the signal quality is appropriate. If the signal quality is poor, confirm correct electrode positioning and contact.
6. Confirm that the diagnostic frequency of 0.05–150 Hz is displayed (this is the preferred corpuls\textsuperscript{3} setting)
7. When the message ‘Ready for D-ECG’ is displayed, press the Start soft-key. The 12-Lead ECG recorded up to this moment is discontinued and saved.
8. When requested, enter the patient’s gender and age, confirm the details by pressing the OK soft-key.
9. Press the Print soft-key.
**Procedure – 12 Lead ECG acquisition**

**LIFEPAK®12:** For comprehensive instructions refer to the LIFEPAK®12 operating instructions

1. Ensure the LIFEPAK®12 is on.
2. Encourage the patient to remain as still as possible.
3. Press the **12-Lead** button.
4. When requested, enter the patient’s gender and age, confirm the details by pressing the selector. If ≤ 15 years is selected the 12-Lead diagnostic frequency will be 0.05–150 Hz even if 0.05–40 Hz is configured as the print default.
5. The 12-Lead ECG will be printed automatically.
Procedure – 12 Lead ECG acquisition

Propaq® MD: *For comprehensive instructions refer to the Propaq® MD operating instructions*

1. Ensure the Propaq® is on.
2. Encourage the patient to remain as still as possible.
3. Press the **12-Lead** key to enter the 12-Lead mode.

4. Ensure that all leads are displayed and that the signal quality is appropriate. If the signal quality is poor, confirm correct electrode positioning and contact.
5. Press the **12-Lead Snapshot** key.
6. Press **Print** to print the displayed 12-Lead ECG.

**Additional information**

- 12-lead ECG electrodes should remain in position to facilitate serial 12-lead ECGs.
- Electrodes must be placed in their anatomically designated positions in order for an ECG to be of diagnostic quality.
- 12-lead ECG diagnostic frequency on the LIFEPAK® is to be set at 0.05–40 Hz for adults.
- Clinicians should ensure the 12-lead ECG is of diagnostic quality (size, frequency and paper speed) before analysing and interpreting.
- Copies of the patient’s 12-Lead ECG(s) (annotated with the patient’s name, date of birth and brief description of symptoms if appropriate) MUST be provided with the eARF to the receiving health care facility.