

# CONTINUOUS ELECTROCARDIOGRAPHIC (ECG) MONITORING PROCEDURE<sup>®</sup>

## DOCUMENT SUMMARY/KEY POINTS

- Standard placement of the three electrodes for continuous ECG monitoring are right arm (RA), left arm (LA) and left leg (LL):
  - Apply RA electrode (white) directly below the clavicle and near the right shoulder.
  - Apply LA (black) electrode directly below the clavicle and near the left shoulder.
  - Apply left leg (LL) (red/green) electrode placed on the left side of the chest, lower edge of left rib cage.
- Lead II is the preferred monitoring lead of choice for continuous ECG monitoring.
- If an arrhythmia is detected the child should be reviewed by a medical officer.
- Staff must respond to alarms promptly and ensure settings are within normal parameters for age group as per the [Between the Flags- Clinical Emergency Response System](#) – SCHN - Procedure

## CHANGE SUMMARY

- Due for mandatory review.
- Changes made throughout. Recommend reading the entire document.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

<b>Approved by:</b>	SCHN Policy, Procedure and Guideline Committee	
<b>Date Effective:</b>	1 <sup>st</sup> March 2023	<b>Review Period:</b> 3 years
<b>Team Leader:</b>	Cardiac Clinical Nurse Specialist	<b>Area/Dept:</b> Cardiology SCH

# READ ACKNOWLEDGEMENT

- Clinical staff who use an ECG monitor are to read and acknowledge they understand the contents of this document.

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# 1 Introduction

## 1.1 Background

- Abnormalities in respiratory rate, heart rate and ECG patterns are the most universally available signs for early recognition of major instability. Continuous ECG monitoring is used to detect instability or changes to patient's heart rate and rhythm. This is supplemental to regular manually preformed observations to inform patient care.
- Nurses who are unfamiliar with continuous ECG monitoring should seek guidance from an experienced colleague.

## 1.2 Rationale

- To obtain a single ECG trace or display a continuous ECG reading so that cardiac arrhythmias can be identified and analysed.

## 1.3 Indications for continuous ECG monitoring

- Post-operative cardiac surgery patient – cessation of monitoring should be ordered in patient's notes by medical officer.
- Patient with known history of arrhythmias or at risk of arrhythmias e.g. accidental drug ingestion, drug toxicity, medication commencement, electrolyte imbalance.
- Patients with suspected malfunction of implanted pacemaker.
- Patients with other clinical conditions as requested by a medical officer.

## 1.4 Definitions

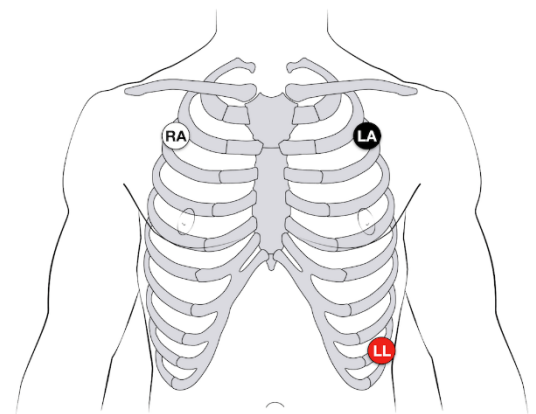
- Electrode:
  - The material containing conductive media that is applied to the patient's skin. Electrodes are placed at different parts of the patient's skin to view the heart's electrical activity from different angles<sup>1</sup>.
- Cable:
  - The wire that attaches to the electrode and conducts current back to the cardiac monitor. One end of a monitoring cable is attached to the electrode, and the other end to the cardiac monitor<sup>1</sup>.
- Lead – has two meanings:
  - The actual tracing that is obtained and is dependent on the position of the electrode and the monitoring of the mode selected. Lead II is the most commonly used when ECG monitoring is required<sup>2</sup>.
  - The wire that connects the patient to the ECG monitor<sup>1</sup>.

## 1.5 Equipment

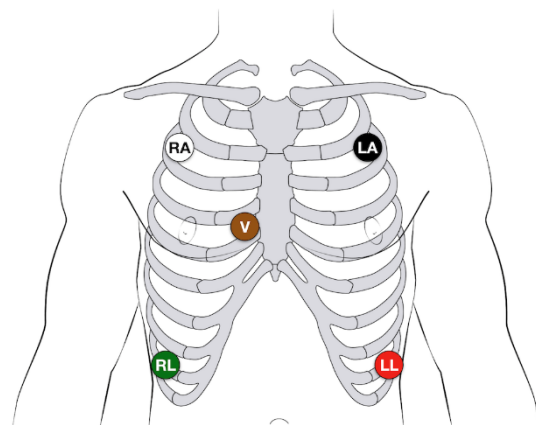
- Monitor
- Cable/wires
- Disposable self-adhesive electrodes

## 1.6 Procedure

1. Explain procedure to child and parent, using developmentally appropriate communication language/techniques<sup>2</sup>. It is important that the child is calm and relaxed for an accurate ECG reading.
2. Turn monitor on.
3. Ensure skin is clean and dry as this will provide optimal electrical contact and a clear signal<sup>2</sup>. Choose sites with intact skin and over soft tissue, not over bony prominences or skin folds as these sites can produce ECG artifacts (see 4.1)<sup>2</sup>.
4. Check that electrodes are still moist with conductive gel<sup>2</sup>. If using the click-on ECG leads place them on to the electrodes first before applying them to the child<sup>2</sup>. Change the electrodes preferably every 24 hours or when necessary<sup>2</sup>.
5. Apply right arm (RA) electrode (white) directly below the clavicle and near the right shoulder<sup>2</sup>.
6. Apply left arm (LA) (black) electrode directly below the clavicle and near the left shoulder<sup>2</sup>.
7. Apply left leg (LL) (red/green) electrode placed on the left side of the chest, lower edge of left rib cage.
8. The electrodes placed at these positions will produce ECG complexes for leads I, II, and III<sup>2</sup> (see Figure 1).
9. If further lead viewpoints are required, apply right leg (RL) electrode on the right side of the lower rib cage (opposite LL electrode)<sup>3</sup>. Then apply the chest lead in the V1 position<sup>3</sup> (See Figure 2).
10. Connect leads to the ECG connection port. Where possible, connect correlating colours into the module<sup>2</sup>. However, be aware that lead placements may not always be colour coded and positions should be checked.
11. Set the monitor to appropriate ECG lead either I, II, III. Lead II is the preferred lead, as it most closely resembles the normal pathway of current of flow in the heart and therefore displays an upright complex with an optimal signal<sup>1</sup>.



**Figure 1: Standard 3-Lead Placement<sup>3</sup>**



**Figure 2: Standard 5-lead placement<sup>3</sup>**

12. Set alarm parameters in accordance with Between the Flags parameters or individual patient's altered calling criteria if applicable. Alarms must always be active i.e. never turned off. Alarms must be responded to promptly.
13. Observations should be performed as per Between the Flags requirements at a minimum. Frequency should be increased as clinically indicated and/or as specified by a medical officer. All cardiac patients require at least fourth hourly oxygen saturation measurement as per Between the Flags. Continuous oxygen saturation monitoring should be implemented as clinically indicated and/or as directed by treating team. Patients in whom haemodynamics may be compromised require 4th hourly blood pressure measurement at a minimum.

See SCHN Procedure [Between the Flags \(BTF\) – Clinical Emergency Response System \(CERS\)](#)

14. Regularly monitor the patient's skin for signs of allergic reactions to electrodes<sup>1</sup>.
15. Cessation of cardiac monitoring should be at the discretion of the treating medical officer.
16. The rhythm should be assessed for the presence of P waves, QRS complex, T wave, regularity and rate (see Figure. 3).
17. If there is concern regarding an abnormal rhythm this should be printed, patient assessment performed and review escalated as required.
18. Any abnormal strips should also be included in the patient record. Sticky tape all sides of the rhythm strip to Non-eMR Mounting Form, ensuring that date, time and lead are visible.

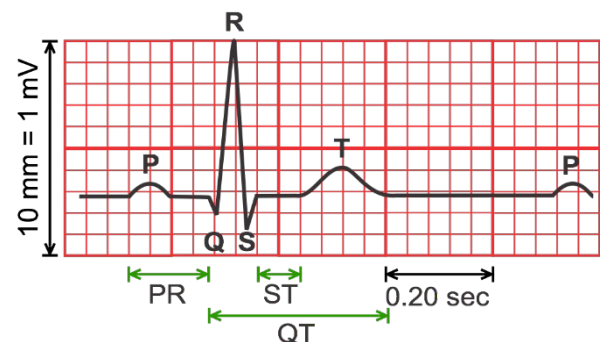


Figure 3: ECG complex in lead II<sup>4</sup>

## 2 Troubleshooting Problems

### 2.1 Artifacts

Distortion of an ECG trace by electrical activity that is non-cardiac in origin is called artifacts or waveform interference<sup>2</sup>. The ECG trace appears bumpy or tremulous.

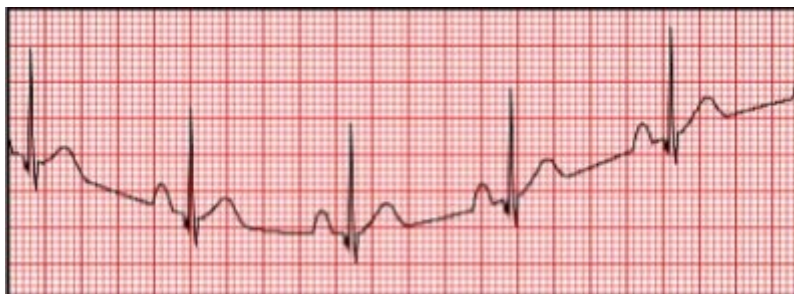


Artifacts troubleshooting guide:<sup>1,2,5,6</sup>

Causes	Actions
Patient movement	Use developmentally appropriate distraction technique
Muscle tremor	Reposition electrodes
Poor electrode contact	Replace electrodes to ensure adequate conduction.
Dry electrodes	Replace electrodes to ensure adequate conduction.
Fractured wires	Replace ECG cable if faulty.
Nearby sources of electrical equipment	Turn off any nearby electrical equipment.

### 2.2 A wandering baseline

This is when the baseline is wandering up and down over the strip<sup>2,6</sup>.

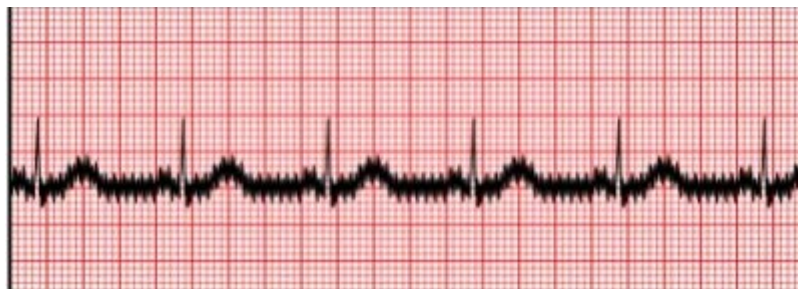


Wandering baseline troubleshooting guide:<sup>1,2</sup>

Causes	Actions
Chest movement during respirations	Reposition electrodes away from the lower ribs or over bone
Restless patient	Utilise developmentally appropriate distraction techniques. Encourage patient to relax
Poor electrode placement	Ensure electrodes are in correct position Reapply electrodes
Poor electrode contact	Ensure electrodes are in correct position and still moist Reapply electrodes

### 2.3 A thick baseline

This is when the baseline is thick, “fuzzy” and unreadable.



Troubleshooting guide:<sup>1,2,6</sup>

Causes		Actions
Electrical interference from other equipment for example mobile phones		Turn off any nearby unnecessary electrical equipment
Electrical power leakage		Check that electrode plugs have not become loose
Electrode malfunction		Replace electrodes
When using Philips monitor – “monitor view” could be selected		Adjust ECG trace size When using Philips monitor – set trace to “filter view”

*It is important to note that accurately recognising artifacts can be complex and may require the assistance of experienced clinicians. Do not hesitate to seek assistance should there be concerns regarding presence of artifacts.*

### 3 References

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