CONTINUOUS ELECTROCARDIOGRAPHY (ECG) MONITORING - SCH

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- All patients who are unstable or potentially unstable require continuous ECG monitoring.
- On the Randwick campus, in the event of sudden deterioration in the patients' clinical condition call **777** immediately to activate a "Code Blue" or "Tier 2 CERS" response.
- Nurses who are unfamiliar with continuous ECG monitoring must satisfactorily complete the learning and competency assessment plan for continuous ECG monitoring.
- Patients on continuous ECG monitoring must have the following documentation as a minimum requirement:
  - The following should be assessed and documented hourly
    - Heart rate and rhythm
    - Respiratory rate and effort
    - Colour, perfusion and capillary refill
    - Fluid balance of both input and output
- An acceptable range of cardiovascular parameters should be documented in the patient's notes by the Senior Medical Officer.
- Alarm parameters must be set appropriately for the individual patient's age and clinical condition and must always be active.
- Staff must always respond to alarms promptly
- If any alteration in the patient's condition occurs or if the documented parameters are not maintained the follow the CERS protocol.
- Patients must have a functional / patent intravenous access device at all times unless otherwise ordered and documented by the SMO.
- The monitor to be used in SCH for continuous ECG monitoring must be able to display ECG complexes and not be merely a pulse oximeter.

Approved by:	SCHN Policy, Procedure & Guideline Committee	
Date Effective:	1st April 2013	**Review Period**: 1 year
Team Leader:	Director of Nursing	**Area/Dept**: Executive Suite - SCH

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CHANGE SUMMARY

- Minor review to:
  - reflect increased responsibilities of Medication Endorsed Enrolled Nurses (EEN).
  - reference the CERS/Between the Flags system.
- Transfer to SCHN style and approval processes.

READ ACKNOWLEDGEMENT

- All Staff listed below must read and notify their local manager that they understand the content of the document.
  - All Clinical Nurses (including CICU and Emergency Department).
  - Nurse Educators and Clinical Nurse Educators
  - Nurse Unit Managers and Nurse Managers.
  - Medical Officers.

Local managers are responsible to maintain records of staff read acknowledgements for quality review and compliance audit processes. Information on systems of staff notification and read acknowledgement are available at: http://chw.schn.health.nsw.gov.au/o/groups/ppc/resources/staff_notification_records_-_information_sheet.pdf

This document policy must be read in conjunction with the following:

- Between the Flags/Clinical Emergency Response System – SCH
- Administration of Intravenous Potassium Chloride – SCH
- Intravenous Medications – Special Precautions List - SCH

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Continuous Electrocardiography (ECG) Monitoring - SCH

Abnormalities in heart rate, ECG patterns and respiratory rate are the most universally available signs for early recognition of major instability. As rapid detection of abnormalities in vital signs is a key determinant in patient care, all patients who are unstable or potentially unstable require continuous ECG monitoring.

Standard

- On the Randwick campus, in the event of sudden deterioration in the patients' clinical condition call **777** immediately to activate a "Code Blue" or "Tier 2 CERS" response.
- Nurses who are unfamiliar with continuous ECG monitoring must satisfactorily complete the learning and competency assessment plan for continuous ECG monitoring.
- Patients on continuous ECG monitoring must have the following documentation as a minimum requirement. Variation in frequency should be guided by patient's clinical condition or as directed by the Senior Medical Officer (SMO).
- The following should be **assessed and documented hourly:**
  - Heart rate and rhythm
  - Respiratory rate and effort
  - Colour, perfusion and capillary refill
  - Fluid balance of both input and output
- The following should be **assessed and documented 4 hourly**:
  - Temperature- 4 hourly
  - Non Invasive Cuff Blood Pressure- 4 hourly
- An acceptable range of cardiovascular parameters should be documented in the patient's notes by the Senior Medical Officer.
- Alarm parameters must be set appropriately for the individual patient's age and clinical condition and must always be active (i.e. never turned off).

  Staff must always respond to alarms promptly.
- If any alteration in the patient's condition occurs or if the documented parameters are not maintained the follow the CERS protocol.
- All patients are to have a latex history taken and documented by the admitting clinician/nurse at the point of entry.
- Patients must have a functional / patent intravenous access device at all times unless otherwise ordered and documented by the SMO.
- The monitor to be used in SCH for continuous ECG monitoring must be able to display ECG complexes (i.e. Spacelabs Medical™) and not be merely a pulse oximeter.
- Standard placement of the three electrodes for continuous ECG monitoring at SCH are, Right Arm, Left Arm and Left Leg.

- Lead II is the preferred monitoring lead of choice for continuous ECG monitoring as it produces a positive deflection.
- ECG electrodes should adhere tightly to the patient's skin this will prevent external influences from affecting the ECG trace.
- ECG electrode placement should be checked each shift as accurate interpretation of arrhythmias depends on proper placement of electrodes and knowing which lead is being viewed.
- ECG electrodes should be changed every 48 hours and as required to prevent drying of the gel. Electrode resistance changes as the gel dries.
- All ECG electrodes should be changed at once if a problem occurs with one electrode, this prevents differences in resistance between electrodes.
- Skin integrity around the ECG electrode should be evaluated on a daily basis monitoring for any allergic reaction to the adhesive or the gel or any alteration in skin integrity. Any changes should be reported to the medical officer and documented in the patients' notes.
- The monitor pattern should be evaluated for the presence of P waves, QRS complex, T wave and the absence of artefact or distortion.

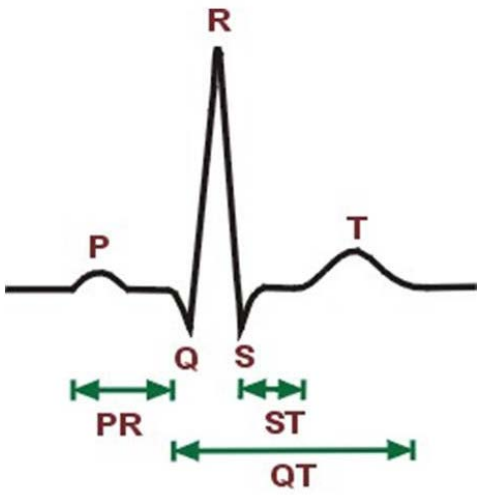

Figure 1: ECG Complex in Lead II[1]

Indications for use

The following patients require continuous ECG monitoring:

- Medications (Refer to Intravenous Medications - Special Precautions List - SCH)
- Postoperative cardiac surgery patients – discontinuation of monitoring should be documented in patient's notes by medical officer.
- Patient with a known history of arrhythmias – tachyarrhythmias and bradyarrhythmias.
- Patients with a suspected malfunction of an implanted pacemaker.
- Patients at risk of arrhythmias, e.g. accidental drug ingestion, drug toxicity.
- Other clinical conditions as requested and documented by the medical officer in the patients notes.

General information

- The ECG records the flow of electrical currents of the heart as they move away or toward a specific electrode, e.g. between one positive and one negative pole.
- Standard lead placement uses leads I, II, and III, forming a triangle referred to as Einthoven's triangle.

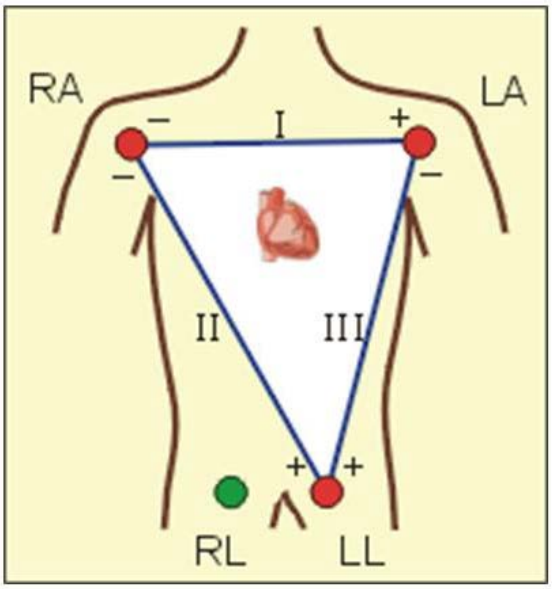

Figure 2: Einthovens triangle[1]

- Each lead provides a different view of the heart's electrical activity.
- The two major factors that determine the views of the ECG deflection on the monitor are the location of the electrodes on the body and the direction of the cardiac impulse in relation to the position of the electrode.
- A three-electrode system has one positive electrode, one negative electrode, and a ground.
- All systems use a ground electrode to prevent accidental electrical shock to the patient.
- Any alteration of electrode position may significantly distort the appearance of the waveform and can lead to misdiagnosis or mistreatment.

Outcome

- Alterations in heart rate and rhythm will be immediately recognised and appropriate action undertaken.

Patient and Family Education

1. Explain the need for continuous monitoring of the heart rate/rhythm with a cardiac monitor

   Rationale: Informs patient/family of the purpose of monitoring, which enhances patient /family co-operation and decreases patient/family anxiety.

2. Explain the equipment to the patient/family

   Rationale: Assists in making them feel more comfortable with monitoring and facilitates patient/family co-operation in maintaining electrode and lead placement.

3. Explain the need for an audible alarm system for determining heart rates below or above an acceptable limit. Demonstrate an alarm system, alerting the patient/family to the possibility of alarms, including causes of false alarms.

   Rationale: Assists the patient/family to understand the values seen while at the bedside. This is achieved by providing an understanding of the use of an alarm system and its importance in the overall management of the patient, as well as of circumstances in which a false alarm may occur.

4. Explain that the values displayed may vary as a result of patient movement, patient level of consciousness (awake or asleep), etc. Patient will always be assessed if heart rate values alter to a level that triggers an alarm.

   Rationale: Decrease patient/family anxiety over the constant variables of the values.

5. Explain that the patient should feel free to move about in the bed.

   Rationale: This will encourage movement on the part of the patient and allay fears about disruption of the monitoring system.

Procedure

1. Explain the procedure to the patient and parents
2. Ensure hands are clean
3. Ensure patient's skin is clean, dry and free of oils/ creams to allow electrode adherence. If skin cleaning is required be sure not to damage or break the skin
4. Electrodes used must be appropriate for the patients size
5. Pre-gelled electrodes should be checked for moisture before application as gel can dry out in storage thus interfering with impulse transmission.
6. All monitoring dots should be placed on soft tissue or close to bone, and not over bony prominences or skin folds
7. Leads from the monitor are placed on the corresponding electrode dots before attachment to the patient; this prevents patient discomfort and disturbance of the contact between the electrode and the skin.

   Figure 3 below show correct electrode placement for three-lead

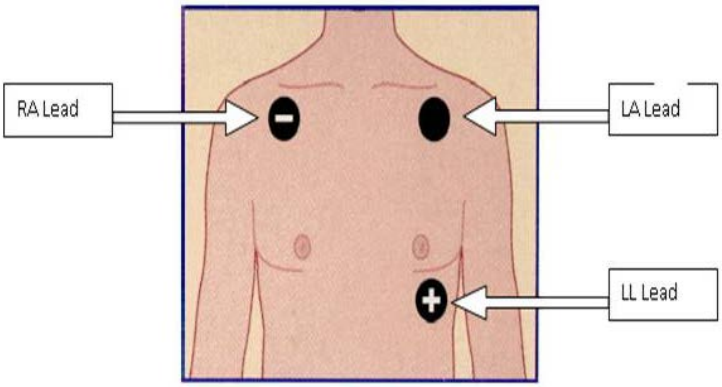

Figure 3: Electrode position for 3-lead ECG monitoring[2]

The figures use the abbreviations RA- Right Arm, LA- Left Arm, LL-Left Leg,

8. Check that the lead wires are plugged into the corresponding patient cable connection correctly and securely in lead system. Lead colours may vary depending on availability.
9. Lead wires and patient cable should be fastened to the patient's gown, making a stress loop and so decreasing tension on the lead wires. The use of safety pins should be avoided.

Trouble Shooting

In the event of the alarm sounding always check the patient's condition first. Check for problems with the equipment only after ensuring patient's condition is stable.

A variety of factors can cause a false alarm to sound or create artefacts on the trace. When looking for potential problems, be systematic. Check the system, beginning with the patient and working back to the monitor.

At the patient:

- Check the patient for movement, e.g. coughing, shivering.
- Check for dry or loose electrodes.
- Check for proper electrode placement, electrode integrity.
- Re-apply fresh electrodes if necessary.

At the leads:

- Check the integrity and the connection of lead wires.
- Check the function of the monitor cable.

At the monitor:

- Check lead selection.
- Check alarm limits.
- Check ECG complex size, adjust size control.

At the bedside:

- Check for electrical interference from other equipment.

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