



## CLINICAL PRACTICE GUIDELINE

Guideline coverage includes NICU KEMH, NICU PMH and NETS WA

# Transcutaneous Monitoring (TCM)

This document should be read in conjunction with the [Disclaimer](#)

To measure the partial pressure of transcutaneous oxygen ( $O_2$ ) and carbon dioxide ( $CO_2$ ) in infants requiring frequent analyses of arterial  $O_2$  and  $CO_2$  to assess the adequacy of their respiratory support and to provide monitoring that may alert carers to a change in condition.

The transcutaneous oxygen/carbon dioxide ( $tcpO_2/tcpCO_2$ ) transducer heats the skin, effectively increasing local blood perfusion so that  $O_2$  and  $CO_2$  can diffuse to the skin surface more easily.

### Inclusion Criteria (Continuous TC Monitoring)

- All admissions requiring ventilation (particularly on HFOV or HFJV) / CPAP for the first 4 days.
- All surgical infants for the first 4 hours postoperatively until medical review.
- All surgical infants **requiring respiratory support postoperatively** for the first 24 hours until medically assessed as stable for intermittent TCM.
- All infants with a pneumothorax (+/- ICC).
- For the first 4 hours post extubation.

### Inclusion Criteria (Intermittent TC Monitoring)

#### ie. Once Per Shift for 4 Hours

- All infants continuing to require respiratory support after the first 4 days of mechanical ventilation.
- All surgical infants continuing to require respiratory support and medically assessed as stable for intermittent TC Monitoring.

### Key Points

- Due to the lack of keratin, all infants born < 27 weeks and < 2 weeks of age must have their transducer temperature set down at  $41^\circ C$ , and the transducer rotated between 2 sites at **2 hourly intervals** to avoid causing skin burns.
- Position infant so not laying on transducer or plastic disc as will increase risk of pressure injury.
- TCM measurements should not replace arterial blood gas monitoring. However, TCM can be used to substantially reduce the frequency of arterial sampling and to observe trends in arterial blood gases following changes to ventilation. To validate correlation it is preferable for TCM to be **in situ** prior to blood gas sampling.
- Very high or low  $PaCO_2$  values may compromise an infant's neurological outcome and are often a sign that ventilator management needs review.
- A rising  $CO_2$  may be an indicator of:
  - Pneumothorax.

- Deterioration (collapse, consolidation, oedema, sepsis).
- Accidental extubation.
- Need for endotracheal suction.

## Equipment

- TCM module & cable
- Calibration gases
- Remembrating kit
- Fixation ring
- Contact fluid

## Transducer Temperature

Set the transducer temperature according to the infant's age:

- 41°C for infants born < 27/40, and < 2 weeks of age.
- 43-44°C for all other infants. A higher transducer temperature results in a better correlation as well as a shorter time delay from the change in arterial blood gas and its detection by the transducer.
- However, higher temperatures may increase the risk of skin burns.

## Timer

Adjust the transducer site timer on the monitor. This is usually set at 4 hours, however an individual assessment must be made on each infant's skin and gestation and often site rotation needs to occur 2 to 4 hourly. The site timer helps guard against the risk of skin burn by ensuring the transducer is used at one site for no longer than a predetermined time.

For infants < 27 weeks and < 2 weeks of age the timer should be set at 2 hours so that the site is rotated every 2 hours.

## Remembrane

- The membranes last approximately 1 week before a change is required. Change the membrane on the transducer if calibration has failed twice.
- Inspect the transducer carefully, ensuring there are two O rings and no visible bubbles. If bubbles are noted, repeat the remembrating procedure.
- Membrane is to be replaced between patients.

## Calibration

Calibration is required when:



- Remembrated.
- The transducer operating temperature has been changed.
- The **tc CAL REQUIRED** message appears on the monitor screen.
- The accuracy of the measurement is in doubt.
- A new monitoring period is to commence.
- The monitoring site has been changed.

## Positioning the Transducer

- Select a site for the transducer. Clean the skin with an alcohol wipe if vernix is present and allow to dry. Sites used include the abdomen, chest and back, avoiding any bony prominences. The anterior thigh can also be used.

Optimum measurement is obtained from a site that has high blood flow and capillary density, thin epidermis (avoid the nipple).

- Apply the fixation ring and instil several drops of contact fluid ready to attach the transducer. After attachment wait for the readings to stabilise.
- Ensure good positioning of the cable, with no kinks or tension on the cable. Ensure the infant is not positioned on the cable.
- Remove the transducer from the infant when the specified monitoring time has elapsed. Prolonged continuous monitoring at one site may cause skin irritation, reddening, blistering or burns.
- Remove the fixation ring **very carefully** particularly in preterm infants to reduce the incidence of epidermal stripping and/or bruising.
- Use standard precautions when decontaminating equipment between infants.

Document owner:	Neonatal Coordinating Group		
Author / Reviewer:	Neonatal Coordinating Group		
Date first issued:	June 2006		
Last reviewed:	1 <sup>st</sup> December 2013	Next review date:	1 <sup>st</sup> December 2016
Endorsed by:	Neonatal Coordinating Group	Date endorsed:	December 2013
Standards Applicable:	NSQHS Standards: 1  Governance, 8  Pressure Injury		
<p><b>Printed or personally saved electronic copies of this document are considered uncontrolled.</b>  <b>Access the current version from the WNHS website.</b></p>			