

Use of Transcutaneous CO₂ Monitoring in NICU

Amendments

Date	Pages	Comment (s)	Approved by
March 2019		New guideline	Neonatal Guidelines Group

Primary Author: Dr Felicity Poulter ST3 Doctor

Anna Sanchez Deputy Sister

Supervisor: Dr Vennila Ponnusamy Neonatal Consultant

Contact for comments: Dr Vennila Ponnusamy
vennilaponnusamy@nhs.net

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Executive summary

Transcutaneous CO₂ monitoring is an important non-invasive tool for the management of babies on both invasive and non-invasive ventilation. This is additionally useful for babies with respiratory distress and poor respiratory drive even when not supported with any respiratory support.

Indications for use of TCO₂ monitoring:

- In all intubated babies
- Post extubation for a minimum of 24 hours with stable FiO₂ <30%
- Premature babies requiring non-invasive respiratory support e.g. BIPAP/CPAP/Vapotherm. If on Vapotherm - consider stopping when stable for at least 24 hrs with a maximum VT of 5 LPM and stable FiO₂ <30%
- In all babies following surfactant administration (through LISA procedure or other modes) for a minimum of 24 hrs
- Any other baby with reduced respiratory drive or increased respiratory distress – If in doubt – please discuss with Registrar /Consultant

The trend of TCO₂ is more important than the individual values – if the trend varies greatly, please review baby and perform blood gas to correlate

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See also: Any relevant trust policies/guidelines or procedures

Training for use of TCO2 is available at

http://www.proprofs.com/training/course/?title=untitled-course_30509_141709

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Introduction

1.1 This guideline aims to guide the reader in the use of transcutaneous CO₂ monitoring in preterm and term babies admitted to the neonatal unit.

1. Scope

2.1 This guideline is relevant to all staff caring for babies across neonatal intensive care, transitional care and maternity.

2.2 This guideline is subject to regular review to ensure ongoing evidence based practice.

2. Purpose

3.1 This guideline aims to facilitate a common approach to the management of babies admitted under neonatal care. At times deviation from the guideline may be necessary, this should be documented and is the responsibility of the attending consultant.

4. Duties and responsibilities

4.1 All health care professionals involved in using the transcutaneous CO₂ monitor have a duty to undertake appropriate training and demonstrate competency in its use.

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5. Policy

5.1 Transcutaneous CO₂ monitoring is an important non-invasive tool for the management of babies on both invasive and non-invasive ventilation. This is additionally useful for babies with respiratory distress and poor respiratory drive even when not supported with any respiratory support.

There are no recent well conducted studies in neonates to establish the effectiveness of TCO₂ monitoring when compared to blood gas PaCO₂. However, several smaller studies have shown that a well sited TCO₂ sensor would provide a good reliable trend of TCO₂ monitoring. In our own audit from 2016, we found that the correlation between transcutaneous CO₂ and blood gas CO₂ was reasonably good (even in cooled babies if TCO₂ monitor is adjusted for body temperature) and is therefore a good guide to altering settings of respiratory support. It allows for reduced blood sampling for gases while providing a continuous non-invasive monitoring.

5.2 Indications for use of TCO2 monitoring:

- In all intubated babies
- Post extubation for a minimum of 24 hours with stable FiO₂ <30%
- Premature babies requiring non-invasive respiratory support e.g. BIPAP/CPAP/Vapotherm. If on Vapotherm - consider stopping when stable for at least 24 hrs with a maximum VT of 5 LPM and stable FiO₂ <30%
- In all babies following surfactant administration (through LISA procedure or other modes) for a minimum of 24 hrs
- Any other baby with reduced respiratory drive or increased respiratory distress – If in doubt – please discuss with Registrar /Consultant

5.3 Equipment

We have 2 types of TCO₂ equipment available to use in our NICU - SENTEC and Radiometer TCM5

5.4 Limitations of TCO2 monitoring:

Babies on TCO₂ monitoring will need to have the values correlated with blood gas CO₂ at regular intervals to have an understanding of the trends of TCO₂ levels for any particular baby.

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NOTE:

- The trend of TCO₂ is more important than the individual values – if the trend varies greatly, please review baby and perform blood gas to correlate
- Following TCO₂ calibration every 4- 6 hrs, the trend may change again. If so, additional blood gases are needed for correlation
- In cooled babies - Please remember to adjust the set temperature on TCO₂ from AUTO to either cooling mode in Sentec monitor or manually adjust baby's cooled temperature to 33.5 °C in Radiometer. Temperature also needs to be corrected in blood gas machine when performing blood gases to 33.5 °C
- The recommended set temperature is 41 °C in Sentec monitor or AUTO mode in Radiometer. However, in extreme premature babies – You can reduce the set temperature on TCO₂ below 40 °C to avoid skin burns. Alternatively, the probe site needs to be changed more often in extreme preterm babies to reduce skin burns. This might be preferable, as the probe dislodges often due to high humidity in these babies.

5.5 Staff training for use of TCO₂ monitoring:

Following a quality improvement project, we have developed an online training module to train all staff to competently use TCO₂ monitors, as below:

http://www.proprofs.com/training/course/?title=untitled-course_30509_141709

This is particularly useful, if you are having difficulties with set up of transcutaneous CO₂ monitor and to learn more about the error codes and how to correct them.

All staff using TCO₂ must complete the training module below to be competent in using and interpreting the monitor values. In addition nurses must complete a medical devices competency sheet'. This training needs to be updated regularly to maintain the skills.

Additional resources to read including manuals for SENTEC and TCM5 are available on the training module for reference.

5.6 Lack of equipment:

Whilst all babies that meet the above indications should have TCO₂ monitoring this is not always possible due to lack of availability of the monitors. If this is the case this should be discussed with the Nurse in charge/Registrar/Consultant to decide which babies should be prioritised for TCO₂ monitoring.

If there are no TCO₂ monitoring equipment available – please fill a DATIX form to highlight the need to purchase more equipment.

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6. Approval and Ratification

6.1 This guideline will be approved and ratified by the Neonatal Guidelines Group.

7. Dissemination and Implementation

7.1 This guideline will be uploaded to the trust intranet 'Neonatal Guidelines' page and thus available for common use.

7.2 This guideline will be shared as part of ongoing education within the Neonatal Unit for both medical and nursing staff.

7.3 All members of staff are invited to attend and give comments on the guideline as part of the ratification process.

8. Review and Revision Arrangements

8.1 This policy will be reviewed on a 5 yearly basis.

8.2 If new information comes to light prior to the review date, an earlier review will be prompted.

9. Document Control and Archiving

9.1 Amendments to the document shall be clearly marked on the document control sheet and the updated version uploaded to the intranet. Minor amendments will be ratified through the Neonatal Guidelines Group. A minor amendment would consist of no major change in process, and includes but is not limited to, amendments to documents within the appendices.

10. Monitoring compliance with this Policy

Measurable Policy Objective	Monitoring/ Audit method	Frequency of monitoring	Responsibility for performing the monitoring	Monitoring reported to which groups/ committees, inc responsibility for reviewing action plans

11. Supporting References / Evidence Base

References:

1. AARC Clinical Practice Guideline: Transcutaneous Monitoring of Carbon Dioxide and Oxygen: 2012 Ruben D Restrepo et al. [Accessed last 7thSep2018]
<http://rc.rcjournal.com/content/respcare/57/11/1955.full.pdf>
2. Geven W B, Nagler E, de Boo T. *et al*/ Combined transcutaneous oxygen, carbon dioxide tensions and end-expired CO₂ levels in severely ill newborns. Adv Exp Med Biol 1987220115–120

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APPENDIX 1: EQUALITY IMPACT ASSESSMENT

Equality Impact Assessment Summary

Name and title: Dr Samantha Edwards, Neonatal Guidelines Meeting Chair
Policy: TCO2 use in NICU

<p>Background</p> <ul style="list-style-type: none"> Who was involved in the Equality Impact Assessment
<p>Neonatal guidelines group</p>
<p>Methodology</p> <ul style="list-style-type: none"> A brief account of how the likely effects of the policy was assessed (to include race and ethnic origin, disability, gender, culture, religion or belief, sexual orientation, age) The data sources and any other information used The consultation that was carried out (who, why and how?)
<p>The group considered the effect of the policy on the various groups within our neonatal population; and staff employed, including race and ethnic origin, disability, gender, culture, religion or belief, sexual orientation and age.</p>
<p>Key Findings</p> <ul style="list-style-type: none"> Describe the results of the assessment Identify if there is adverse or a potentially adverse impacts for any equalities groups
<p>The policy is inclusive</p>
<p>Conclusion</p> <ul style="list-style-type: none"> Provide a summary of the overall conclusions
<p>No adverse features of the policy identified</p>
<p>Recommendations</p> <ul style="list-style-type: none"> State recommended changes to the proposed policy as a result of the impact assessment Where it has not been possible to amend the policy, provide the detail of any actions that have been identified Describe the plans for reviewing the assessment
<p>The policy is suitable for implementation.</p>

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APPENDIX 2: CHECKLIST FOR THE REVIEW AND APPROVAL OF DOCUMENTS

To be completed (electronically) and attached to any document which guides practice when submitted to the appropriate committee for approval or ratification.

Title of the document:

Policy (document) Author:

Executive Director:

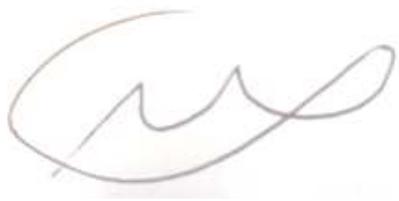
		Yes/No/ Unsure/ NA	<u>Comments</u>
1.	Title		
	Is the title clear and unambiguous?	Y	
	Is it clear whether the document is a guideline, policy, protocol or standard?	Y	
2.	Scope/Purpose		
	Is the target population clear and unambiguous?	Y	
	Is the purpose of the document clear?	Y	
	Are the intended outcomes described?	Y	
	Are the statements clear and unambiguous?	Y	
3.	Development Process		
	Is there evidence of engagement with stakeholders and users?	Y	Nursing staff contributed to creation of guideline
	Who was engaged in a review of the document (list committees/ individuals)?		Neonatal guidelines group
	Has the policy template been followed (i.e. is the format correct)?		
4.	Evidence Base		
	Is the type of evidence to support the document identified explicitly?	Y	
	Are local/organisational supporting documents referenced?	NA	
5.	Approval		
	Does the document identify which committee/group will approve/ratify it?	Y	
	If appropriate, have the joint human resources/staff side committee (or equivalent) approved the document?	NA	
6.	Dissemination and Implementation		
	Is there an outline/plan to identify how this will be done?	Y	
	Does the plan include the necessary training/support to ensure compliance?	Y	
7.	Process for Monitoring Compliance		

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		Yes/No/ Unsure/ NA	<u>Comments</u>
	Are there measurable standards or KPIs to support monitoring compliance of the document?	NA	
8.	Review Date		
	Is the review date identified and is this acceptable?	Y	
9.	Overall Responsibility for the Document		
	Is it clear who will be responsible for coordinating the dissemination, implementation and review of the documentation?	Y	
10.	Equality Impact Assessment (EIA)		
	Has a suitable EIA been completed?	Y	

Committee Approval (Neonatal Guidelines Committee)

If the committee is happy to approve this document, please complete the section below, date it and return it to the Policy (document) Owner

Name of Chair	Samantha Edwards	Date	25 March 2019
			

Ratification by Management Executive (if appropriate)

If the Management Executive is happy to ratify this document, please complete the date of ratification below and advise the Policy (document) Owner

Date: n/a

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