Document Control

Title			
Fetal and Cord Blood Sampling Guideline			
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0.2	Aug 2009	Draft	Amendments from Guideline Group
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1.0	Dec 2009	Revision	Revised to incorporate CNST Assessors Comments
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3.1	Aug 2011	Revision	Revised for new template. No clinical changes.
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4.1	Feb 2013	Revision	Minor amendments by Corporate Governance to document control report and formatting for document map navigation and semi-automatic table of contents. Published on Trust Intranet.
4.2	Aug 2015	Revision	Revised Guidelines

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Superseded Documents None	

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Consulted with the following stakeholders: (list all) • **Infection Control** • **Medicines Management** • Senior Midwives • Obstetricians and Gynaecologists • Women's and children's Directorate Management		
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2. Contents

3. Introduction

This document sets out Northern Devon Healthcare NHS Trust's best practice guidelines for Fetal Blood sampling during labour and Cord Blood sampling post-delivery.

4. Indications

Fetal blood sampling should be undertaken if the CTG is abnormal and indicates need for conservative measures and further testing to investigate the fetal condition when delivery is contemplated (See ***NICE Clinical Guideline 190*** Intrapartum care: care of healthy women and their babies during childbirth December 2014).

The significance of a pathological CTG is much greater in the presence of meconium or no liquor. Following ROM, absence of liquor should be managed as though meconium were present. If the CTG is abnormal in the presence of thick, fresh meconium, deliver immediately.

- Cord Blood paired sampling should be performed within 30 minutes of delivery in:

1. All cases where instrumental or operative delivery has been performed to expedite delivery due to suspected fetal distress.

2. All cases where the baby's condition at birth is poor with Apgar's below 7 at 5 minutes.

3. When fetal blood sampling has been undertaken during the course of the labour irrespective of outcome or mode of delivery.

4. Shoulder dystocia

5. Where meconium is present

5. Contraindications of fetal blood sampling

- Maternal Infection e.g. HIV, Herpes Simplex Virus, Hepatitis.
- Known fetal bleeding disorders e.g. haemophilia, maternal thrombocytopenia.
- Prematurity under 34 weeks
- Face presentation.
- Acute fetal compromise
- Suspected intrauterine sepsis
- Relative contraindications: Cervical dilatation of 3cm or less, Gestation range 34-36+6 weeks and maternal pyrexia above 380 C
- Evidence of chronic hypoxia or sinusoidal pattern

6. Definitions

- In cases of a non-reassuring CTG trace, continuous CTG monitoring and careful observations of maternal and fetal wellbeing should be undertaken and clearly documented in the labour record.
- In cases of an abnormal fetal heart trace, continuous CTG and fetal blood sampling should be undertaken where feasible. In situations where fetal blood sampling is not possible, delivery should be expedited.
- If there is clear evidence of acute fetal compromise when CTG is abnormal and indicates **need for urgent intervention** as bradycardia or single prolonged deceleration with baseline below 100 beats/minute, persisting for 3 minutes or more the delay caused by undertaking fetal blood sampling should be avoided: start conservative measures, urgently seek obstetric help, make preparations for urgent birth, and expedite the birth if the bradycardia persists for 9 minutes. If the fetal heart rate recovers at any time up to 9 minutes, reassess any decision to expedite the birth, in discussion with the woman.
- FBS should be avoided directly after a bradycardia or prolonged decelerations as it will show a false abnormal result.
- ***FBS can be falsely reassuring in cases of sepsis and Fetal Haemorrhage:*** pH measurements in these circumstances may delay accurate diagnosis and intervention, and may increase fetal risk.

7. Counselling when offering Fetal Blood Sampling:

- Why the test is being advised.
- The blood sample will be used to measure the level of acid in the baby's blood, to see how well the baby is coping with labour.
- The procedure will require her to have a vaginal examination using a small device similar to a speculum.
- A sample of blood will be taken from the baby's head by making a small scratch on the baby's scalp. This will heal quickly after birth, but there is a small risk of infection.
- The procedure can help to reduce the need for further, more serious interventions.
- What the different outcomes of the test may be (normal, borderline and abnormal) and the actions that will follow each result.
- There is a small chance that it will not be possible to obtain a blood sample (especially if the cervix is less than 4 cm dilated). If a sample cannot be obtained, a caesarean section or instrumental birth (forceps or ventouse) may be needed because otherwise it is not possible to find out how well the baby is coping.
- Consent of the patient must be obtained and documented in the notes.

8. Method of obtaining Fetal Blood Sample

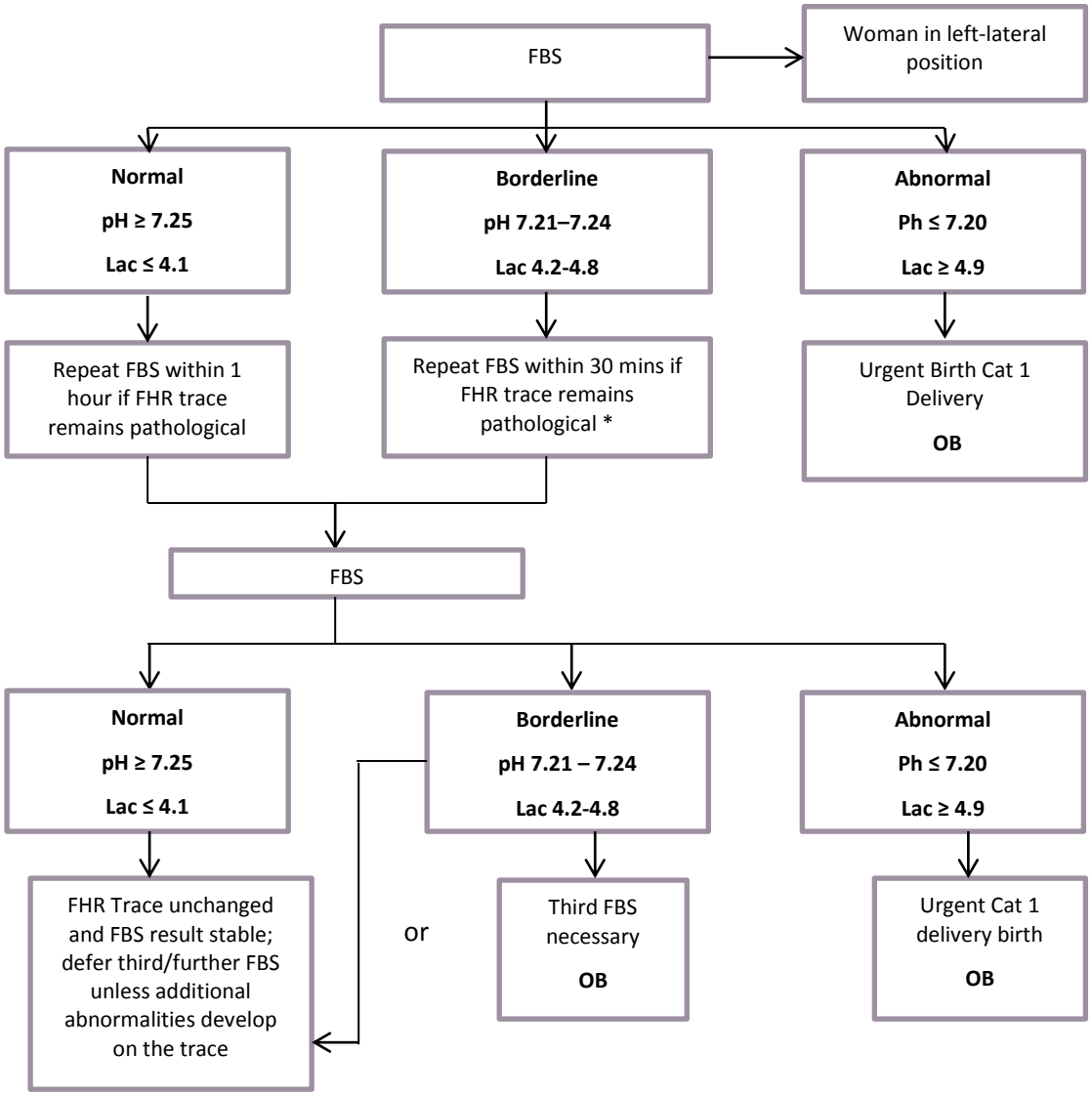
- Ensure that the blood gas analyzer is in the standby mode.
- Wear universal protective clothing in line with Trust policy.
- Use disposable fetal blood sampling kit.
- Perform a vaginal examination to assess stage of labour and exclude face presentation.
- Position the woman in the left lateral position (may require leg support for the uppermost leg).
- The amnioscope is passed into the posterior vaginal fornix and the obturator is then removed.
- The amnioscope is maneuvered to rest against the fetal head.
- Clean fetal scalp with dental roll, gauze or cotton wool.
- Avoid undue pressure on fetal scalp with amnioscope as this may lead to venous congestion.
- Avoid contamination of sample with Meconium or amniotic fluid as this may lead to a false result.
- Spray Ethyl Chloride under direct vision onto fetal scalp and allow to evaporate and reactive hyperaemia to develop.
- Apply a thin film of paraffin wax to fetal scalp.
- A 2mm fetal scalp incision is made with steady pressure of the blade which does not protrude more than 2mm.
- Collect the resultant globule of blood in a heparinised capillary tube, allowing the sample to run downhill.
- A 4 cm unbroken column of blood is required. There should be no air bubbles or debris in the sample.
- Seal the capillary tube with the caps provided in the kit before transport to the analyzer.
- Transfer the sample without delay to the blood gas analyzer and process by a member of staff competent to use the analyzer.
- If the blood gas analyzer is out of operation and a sample needs to be sent to the laboratory ensure that the technician is awaiting the sample and is aware that an urgent result is required. A porter should be standing by on labour ward to avoid unnecessary delay in transportation.
- Repeat above steps and take a second sample (for immediate analysis in blood gas analyser)
- Pressure is applied to the incision site with a dry swab until the bleeding stops.
- Reposition the mother once the results are available and inform her of the result and subsequent plan of care.
- All results and the plan of care should be clearly documented in the labour notes. This will include the timing of the first sample and the timings of any subsequent samples. The results should be hand written in the notes and on the CTG trace as the results slip may fade over time.

- Measure either lactate or pH when performing fetal blood sampling. Measure lactate if the necessary equipment and suitably trained staff are available; Otherwise measure pH
- Fetal scalp lactate is an appropriate indicator of fetal hypoxia during the first stage and passive second stage of labour but NOT after the commencement of active pushing during second stage of labour. CTG abnormalities during the active second stage of labour require consideration of expedited delivery NOT further assessment by FBS.
- The time taken to obtain a FBS needs to be considered when planning repeat samples.

9. Complications:

Complications are very rare; haemorrhage, infection and breakage of the blade. The incision should be observed until all the bleeding ceased. If significant bleeding persists the baby should be delivered. Postnatal examination of the baby should include examination of the sampling site.

10. Flowchart for Fetal Blood Sampling



OB = seek Consultant Obstetrician advice. Contact by personal 'bleep' or via switchboard.

*If the baby is growth-restricted and the CTG remains pathological after a normal FBS result, FBS should be repeated after half hour.

All results should be clearly documented in the notes and on the CTG trace including the timing of the first sample and any subsequent samples thereafter.

11. Interpretation of the FBS results:

- Normal and borderline samples should be repeated sooner if there is any further deterioration.
- Interpret fetal blood sample results taking into account any previous lactate or pH measurement, the rate of progress in labour and the clinical features of the woman and baby.

- Inform the consultant obstetrician if any fetal blood sample result is abnormal, a fetal blood sample cannot be obtained or a third fetal blood sample is thought to be needed.
- If the fetal blood sample result is normal, offer repeat sampling no more than 1 hour later if this is still indicated by the CTG trace, or sooner if additional non-reassuring or abnormal features are seen.
- If the fetal blood sample result is borderline, offer repeat sampling no more than 30 minutes later if this is still indicated by the CTG trace, or sooner if additional non-reassuring or abnormal features are seen.
- If the CTG trace remains unchanged and the fetal blood sample result is stable (that is, lactate or pH is unchanged) after a second test, further samples may be deferred unless additional non-reassuring or abnormal features are seen

12. Failed fetal blood sampling:

- Should be discussed with consultant Obstetrician
- If a fetal blood sample is indicated and the sample cannot be obtained, but the associated scalp stimulation results in fetal heart rate accelerations, decide whether to continue the labour or expedite the birth in light of the clinical circumstances and in discussion with the woman
- If a fetal blood sample is indicated but a sample cannot be obtained and there is no improvement in the CTG trace, explain to the woman that the birth should be expedited

13. Method of obtaining Cord Blood paired sample

You have up to 30 minutes after the birth of the baby to obtain the sample and only if the cord has been double clamped. The optimum time is approximately 10 minutes. The blood will not clot in the cord but will clot in the syringe.

You will need:

- An additional clamp for double clamping
- Length of cord secured between two 'Spencer-Wells' artery forceps or clamps (approx. 15-30cm of cord)
- A pre-heparinised syringe and needle
- Gloves
- Eye protection and gown or plastic apron
- Gauze to prevent spray when needle removed from cord
- Two samples should be taken, one from the umbilical vein and one from the umbilical artery. Both should be clearly labelled as to source. **(The arterial sample is the most representative of the acid base status of the fetus)**

- In a pre-heparinised syringe 1-2ml of blood is adequate. Identify each sample (venous or arterial) clearly once the sample has been entered into the blood gas analysis machine's keyboard.
- The results and the plan of care should be clearly documented in the birth notes.
- The pH should be at least 0.03 units lower in the artery

Normal Cord blood values

Normal cord blood gas and pH (during and post labour) at term	pH	Base excess (mmol/l)	pCO2 (kPa)	Lactate
Umbilical Artery	7.05-7.38	-2.5 to 10.0	4.9 – 10.7	≤6.1mmol/L
Umbilical Vein	7.17-7.48	-1.0 to 9.0	3.5 – 7.9	

Reference range for umbilical artery blood gas values in preterm new-borns

Umbilical arterial blood	Mean	5th to 95th percentile
pH	7.28	7.14 to 7.4
PCO_2 (mmHg)	50.2	32 to 69.2
HCO_3 (mEq/L)	22.4	16 to 27.1
Base excess (mEq/L)	–2.5	–7.6 to 1.3

- Low pH, high pCO2 and normal base deficit/base excess = respiratory acidosis
- Low pH and high base deficit in the artery with normal base deficit in the vein = short lasting hypoxia
- Low pH and high base deficit in both the artery and the vein = longer lasting hypoxia
- The printout should be securely fixed in **either** the mothers or the baby's medical notes at the appropriate chronological place.
- If the baby unexpectedly has respiratory depression at birth, admitted to NNU or the pregnancy is complicated (e.g. preterm / stillborn / abruption / suspected chorioamnionitis) take a swab from between the placental membranes and send placenta for histology.

- In the case of a stillbirth/neonatal death the placenta should be sent at the same time as the baby's body is taken to the mortuary.

14. Education and Training

It is the responsibility of all staff using and interpreting fetal heart traces to undergo six monthly training in the interpretation of CTG traces and be familiar with fetal blood sampling guidelines.

It is the responsibility of all staff to be aware of the indications for fetal blood sampling and the method used to conduct both fetal blood sampling and cord blood paired samples.

Responsibility for education and training lies with the Practice Development Midwives. It will be provided through formal study days and informal training on the ward. Clinicians performing the tests should be accredited and bound by the recommendation for good practise.

The importance of adequate Blood Gas Analyser maintenance in obtaining accurate results also needs to be emphasised (Ciba Corning – 1999)

15. Consultation, Approval, Review and Archiving Processes

The author consulted with all relevant stakeholders. Please refer to the Document Control Report.

Final approval will be given by the Maternity Services Guideline Group.

The guidelines will be reviewed every 3 years. The author will be responsible for ensuring the guidelines are reviewed and revisions approved by the Maternity Services Guideline Group in accordance with the Document Control Report.

All versions of these guidelines will be archived in electronic format by the author within the Maternity Team policy archive.

Any revisions to the final document will be recorded on the Document Control Report.

To obtain a copy of the archived guidelines, contact should be made with the Maternity team.

16. Monitoring Compliance with and the Effectiveness of the Guideline

Monitoring of implementation, effectiveness and compliance with the Fetal Blood Sampling guidelines is the responsibility of the senior clinical/management team. The maternity services audit program and methodology of process, reporting and escalation is described in **Appendix A** using the audit criterion in **Appendix B**.

17. References

St George's NHS Healthcare Trust Guideline

Up-to-date website:

http://www.uptodate.com/contents/umbilical-cord-blood-acid-base-analysis-at-delivery?source=search_result&search=cord+blood+gases&selectedTitle=1%7E150

Nice Guidelines, intrapartum care CG190:

https://www.nice.org.uk/guidance/cg190

https://thewomens.r.worldssl.net/images/uploads/downloadable-records/clinical-guidelines/fetal-blood-sampling.pdf

https://www.networks.nhs.uk/nhs-networks/staffordshire-shropshire-and-black-country/documents/Fetal%20Blood%20Sampling%202013.pdf

18. Associated Documentation

- Auscultation and Electronic fetal monitoring Guidelines
- Caesarean Section Guidelines
- Operative Vaginal Delivery Guidelines

Appendix A – Audit methodology for fetal and cord blood sampling

NDHT Obstetrics, Gynaecology and Midwifery Guideline:	Fetal and cord blood sampling Guidelines				
CNST Ref:	Standard:	2	Criterion:	4	
Monitoring arrangements	Clinical Audit			Y	Annual
	Monitoring			Y	1% or 10 sets
	Case Review			Y/N	
Monitoring Arrangements Northern Devon Healthcare Trust Maternity Services will monitor compliance of this guidance against all minimum requirements within the CNST maternity standards by an annual audit, supported by specific audits during the year that are triggered by the clinical incident reporting system, or in response to a change in practice					
Lead for Monitoring Compliance	Post Holder Job Title			Lead Consultant for Labour Ward	
Method					
• Sample	1% or 10 sets, whichever the greater, of health records of women who have delivered in whom fetal blood sampling or paired cord sampling has been undertaken.				
• Audit tool	An audit tool will be developed using the standard statements set out in appendix 2				
• Data collection process	Patient notes will be audited by a clinically qualified member of staff. The information will be recorded using the audit tool.				
• Process for collating and reporting data	Data will entered and analysed using appropriate software to show compliance levels. All the results will be reviewed by a multi-disciplinary team at the Maternity Services Patient Safety Forum.				
Frequency of monitoring/audit	Annual Audit				
Process for reviewing results and ensuring improvements in performance occur	The Maternity Services Patient Safety Forum will develop an action plan to improve compliance and ensure improvements in performance occur. Action plans will be implemented by the Risk coordinator and Practice Development Midwives to ensure learning takes place. The Maternity Services Patient Safety Forum will monitor progress of action plan monthly and exceptions will be reported via this group to the Clinical Governance Committee. Identified risks related to non-compliance with these guidelines through audit will be registered on the Trust Risk System by the Risk coordinator.				

Appendix B – Audit Criterion for Fetal and Cord Blood Sampling Guideline

Criterion statements for audit tool							
Ref	Criterion statements	Target	Exceptions	Indicator/Location of information		National guidance Reference	Trust guideline reference
				Where the information against which compliance can be audited is recorded? e.g. Postnatal notes e.g. Stork screen	Page no/ Field	Which national guidance does this demonstrate compliance with e.g. NICE CG190 1.10.41 - 60	On which page of the Trust guideline is the relevant statement?
1	Was fetal blood sampling undertaken in line with the guideline	75%					
2	Was the reason for fetal blood sampling documented	75%					
3	Were the Fetal Blood Sampling results documented?	75%					
4	Was the timing of repeated FBS documented?	75%					
5	Was referral to Consultant Obstetrician undertaken, if so, when?	75%					
6	Were paired cord samples taken appropriately?	75%					
7	Were the results of the paired cord sample recorded in the labour records?	75%					