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Labour and birth

Clinical Practice Guidelines 2012

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ABBREVIATIONS

BMI	body mass index
BP	blood pressure
CI	confidence interval
CTG	cardiotocography
DCC	delayed cord clamping
EAS	external anal sphincter
ECC	early cord clamping
CEFM	continuous electronic fetal monitoring
EL	evidence level (level of evidence)
Entonox®	mixture of oxygen and nitrous oxide
FBS	fetal blood sampling
FHR	fetal heart rate
GP	general practitioner
IAS	internal anal sphincter
IM	intramuscular
IV	intravenous
MSL	meconium stained liquor
NICE	National Institute for Health and Clinical Excellence
NICU	neonatal intensive care unit
PCA	patient-controlled analgesia
PCEA	patient-controlled epidural analgesia
PPH	postpartum haemorrhage
OA	occipital anterior
OP	occipital posterior
OR	odds ratio
OT	occipital transverse
PROM	prelabour rupture of membranes
RCT	randomised controlled trial
RR	relative risk
SD	standard deviation
TENS	transcutaneous electrical nerve stimulation
VE	vaginal examination

GLOSSARY OF TERMS

Appraisal of evidence: Formal assessment of the quality of research evidence and its relevance to the clinical question or guideline under consideration, according to predetermined criteria.

Best available evidence: the strongest research evidence available to support a particular guideline recommendation.

Cochrane Collaboration: An international organisation in which experts find, appraise, and review randomised controlled trials. The Cochrane Database of Systematic Reviews contains regularly updated reviews on a variety of health issues and is available electronically as part of the Cochrane Library.

Consensus statement: A statement of the advised course of action in relation to a particular clinical topic, based on the collective views of a body of experts.

Evidence level: A code (e.g. I, II, III-2, III-3, IV) linked to an individual study, indicating where it fits into the hierarchy of evidence and how well it has adhered to recognised research principles. Also called levels of evidence.

Meta-analysis: A meta-analysis refers to methods employed to contrast and combine results from different studies, to identify patterns among study results, areas of agreement or disagreement among those results, or other relationships that may come to light.

Systematic review: A review in which evidence from scientific studies has been identified, appraised, and synthesised in a methodical way according to predetermined criteria. It may or may not include a meta-analysis.

GUIDELINE DEVELOPMENT ACKNOWLEDGEMENTS AND MEMBERSHIP

The labour and birth Guideline Development Group wish to give thanks for contributions made by all the midwifery and medical staff that have contributed to the formulation of these guidelines.

MEMBERS OF THE GUIDELINE COMMITTEE:

Tanya Farrell	Co-chair, 3centres Collaboration
Euan Wallace	Co-chair, 3centres Collaboration
Wendy Cutchie	Project Manager, 3centres Collaboration
Robyn Aldridge	Obstetric expert, 3centres Collaboration

GUIDELINE DEVELOPMENT GROUP

Angela Muir	Mercy Hospital for Women
Bernadette White	Mercy Hospital for Women
Caprice Brown	Royal Women's Hospital
Christine East	Monash Medical Centre
Christine Tippett	Maternity & Newborn Clinical Network
Jacobus DuPlessis	Royal Women's Hospital
Jenny Ryan	Royal Women's Hospital
Karen Moffat	Royal Women's Hospital
Kerrie Papacostas	Monash Medical Centre
Lynne Stewart	Monash Medical Centre
Megan Burgmann	Mercy Hospital for Women
Michael Rasmussen	Mercy Hospital for Women

AIM

This guideline aims to provide consistent, evidence-based advice on the care of women and their babies at term (37-42 weeks gestation) during the intrapartum period at the three level six (tertiary) maternity services in Victoria. Namely; Mercy Hospital for Women, Monash Medical Centre, and The Royal Women's Hospital.

It is anticipated that this guideline will be used as a basis for the development of guidelines at other hospitals; which will take into account local service provision and the needs of the local population.

SEARCH AND APPRAISAL

The following methods of search and appraisal were used: An Ovid platform database search was undertaken using Medline, Embase, CINAHL and Cochrane databases for evidence published in English. Most of these publications were sourced from the year 2000 onwards however, where high quality evidence was lacking, publications may date further back to capture earlier evidence.

Professional body websites were also used. These included the American College of Obstetricians and Gynecologists (ACOG), Royal Australian and New Zealand College of

Obstetricians and Gynaecologists (RANZCOG), Royal College of Obstetricians and Gynaecologists (RCOG), Society of Obstetricians and Gynaecologists of Canada (SOGC).

Other websites accessed were: National Health and Medical Research Council (NHMRC), National Institute for Health and Clinical Excellence (NICE) World Health Organisation and BMJ Best practice. The 3centres Collaboration has predominately endorsed the NICE Intrapartum care of healthy women and their babies during childbirth 2007 guideline. www.nice.org.uk

Clinical questions were devised and for each topic area, the highest available level of evidence using NHMRC grading criteria was selected. Evidence included systematic reviews, meta-analysis, or randomised controlled trials (RCT's). Where reviews or RCT's did not exist, other appropriate cohort studies, case series, or observational studies were included.
Where no substantial evidence was available to answer the clinical question, formal consensus methods were used to identify best practice and recommendations were made accordingly.

Published guidelines from each of the three level six (tertiary) maternity hospitals were gathered, compared, and contrasted against the international reviews and guidelines.

Following an iterative consultation process among key stakeholders from the three level six hospitals, a consensus of opinion was gained in most instances. In cases of conflicting points of view, a variance process was initiated whereby the Co-Chairs of the 3centres Collaboration made the final decision.

INTRODUCTION

The World Health Organisation describes normal birth as *"Spontaneous in onset, low-risk at the start of labour and remaining so throughout labour and delivery. The infant is born spontaneously in the vertex position between 37 and 42 completed weeks of pregnancy. After birth mother and infant are in good condition".* [1]

Labour and birth at term of a singleton pregnancy is a normal physiological process, accounting for 56% of all births in Victoria in 2009.[2]

Health care providers are able to greatly influence the outcomes of this process. Therefore, it is imperative that all health care disciplines work harmoniously and collaboratively in order to achieve the optimum outcome for the woman and her baby.

CORE ASSUMPTIONS

This guideline has been developed around a set of core assumptions that underpin the philosophy that care remains woman-centred, is informed by international standards, and is evidence based best practice. These assumptions are:

- labour and birth are considered to be a natural physiological process until established otherwise
- there should be a valid medical reason before intervening with the process of normal labour and birth
- the woman will be kept informed of her progress throughout labour
- the clinician, in partnership with the woman, is responsible for informed decision making
- collaboration and cooperation between the professional groups underpins optimal care for all women
- there will be appropriate and timely escalation processes to expedite decision-making and action

3 CENTRES COLLABORATION RECOMMENDATIONS

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Telephone triage and advice ▪ Listen to the woman's story with sympathy and concern ▪ All advice is individualised according to the woman's circumstances ▪ Each maternity unit should have clear, easily accessible pathways for appropriate telephone triage questions to ask and advice that should be given ▪ Telephone advice imparted should be clearly documented with the date, time, printed name and signature of the clinician taking the call ▪ Telephone advice forms should be centrally located and easily accessible for subsequent calls ▪ Clinicians should be adequately trained and experienced when telephone triaging ▪ Qualified interpreters are the preferred option, as culture and custom can be a barrier to effective communication when family members are used as interpreters ▪ The woman could be invited to attend the hospital for assessment at any time and should be encouraged to attend after three telephone calls or should the clinician deem it necessary	9
Latent phase of labour ▪ The latent phase can be defined as: contractions that may be painful and regular or could vary in strength and frequency. The process of cervical effacement has begun, which may also include some cervical dilatation ▪ The average length of a latent phase for a spontaneous labour at term, with a fetal vertex position, in a well woman and fetus is an estimated 12 hours for nulliparous women (but could be as long as 20 hours) and 6 hours for multiparous women ▪ Place of care is ideally at home unless preference or circumstance dictate otherwise ▪ Women should maintain normal levels of activity, continue with a light diet, ensure good hydration, take a warm bath, take simple over the counter analgesia such as paracetamol and advised against mixing stronger analgesia such as Panadeine Forte® with sedatives such as temazepam, rest as much as is needed, call or return to the hospital at any time. ▪ Baseline observations will include - assessment of maternal and fetal wellbeing and a vaginal examination ▪ Where the latent phase is considered prolonged, experienced clinicians should be consulted and a plan made with the woman as to whether she return or remain at home, or be admitted to the hospital and whether to institute an induction of labour process ▪ If a woman has telephoned or presented to the hospital 3 times in the current latent phase, attendance at the hospital is advised for assessment or admission and on going plans made	11
First stage of labour definition, duration and delay ▪ First stage is defined as: progressive cervical effacement and dilatation from 3-4cm onwards, with regular painful contractions lasting until 10cm dilatation ▪ Duration: nulliparous women up to 20 hours. Multiparous women up to 15 hours ▪ Delay diagnosis is not based on duration alone. Strength and frequency of contractions, fetal descent and rotation, cervical dilatation, plus maternal and fetal well-being must all be considered ▪ Research is divided as to whether amniotomy shortens labour or confers any benefits in cases of delay. Experienced clinicians should be consulted and the evidence discussed with the woman	15
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FIRST STAGE OF LABOUR

Search terms/key words used: Suspected Labour (Labor), Advice, Advise, Telephone, Routine, Assessment, Risk, Maternal, Fetal, Document*, History, Latent, Phase, Stage, Duration, Delay, Dystocia, Length, Prolonged, Management, Care, Arrest, First Stage, Nullip*, Primip*, Multip*, Admission, Diagnostic Test, Routine, Maternal Observations, Vital Signs, Advanced Observations, Invasive Monitoring, Partogram, Partograph, Action Line, Alert Line, Urinalysis, Dipstick, Bladder Care, Routine, Proteinuria, Ketonuria, Glycosuria, Hygiene, Douching, Infection, Eating, Drinking, Hydration, Food, Fluids, Move(Ing), vaginal examination, meconium, liquor, morbidity, mortality, meconium stained liquor, meconium aspiration syndrome, ARM, Position(Ing), Mobilise(Ing), Birth Aids, Birth Ball, Environment, Upright, Activity, Pain, Analgesia, Pharmacological, Complementary, Homeopathic, Biofeedback, Acupuncture, Acupressure, opioids, inhalational, epidural, spinal, PCA.

Telephone triage; Latent phase; Definition; duration & delay; Observations; Bladder care; Eating & Drinking; Hygiene; Vaginal examinations; Liquor; Positions & mobilisation; Non-pharmacological analgesia; Pharmacological analgesia.

Telephone triage and advice

Clinical questions

1. What questions should be asked of a woman who telephones and is in suspected labour in order to assess maternal and fetal risk?
2. What advice should a woman receive who telephones and is in suspected labour?
3. What should be documented as a result of a telephone consultation?

1. What questions should take place for a woman who telephones and is in suspected labour in order to assess maternal and fetal risk?

There is a dearth of high-level evidence to support the use of telephone triage services for women who are in suspected labour. However, a survey of all heads of midwifery services in the UK in 2007, (The OPAL study) demonstrated that many hospitals have adopted a telephone, triage/early assessment service with good effect.[3]

An evaluation of the telephone component of the 'All Wales clinical pathway for normal labour', which includes the offer of evidence based advice to women by telephone in early labour, found that longer telephone conversations with midwives increased maternal satisfaction.[4]

A qualitative study using semi-structured interviews by Cheyne et al. in 2007, revealed that women who had not taken steps to prepare for labour often felt anxious, lacked confidence in their ability to cope with labour and pain, which influenced their decision to go to the hospital early. The study also demonstrated that midwifery reassurance by telephone delayed unnecessary early admission.

Women also found that when presenting to hospital only to be advised to return home, was disappointing and in some only served to heighten their anxiety. In others, it was the reassurance they needed to stay at home for longer.[5]

Summary question 1.

Very little high level evidence is available on which to base recommendations on telephone triage advice. Low level evidence and good practice points would suggest that maternity units utilise some form of early assessment triage practices.

Good practice points would seem reasonable for the following, as a minimum level of enquiry.

It is imperative to listen to the woman's story, to acknowledge the level of pain she may be experiencing and to impart interest and concern at all times. The decision to either stay at home or come to the hospital rests primarily with the woman. However, there may be circumstances whereby a recommendation to immediately present to the hospital is made, for example in the case of:

- A known fetal malpresentation.
- Previous caesarean section.
- Fetal growth restriction.
- A history of precipitate labour and birth.

To assess maternal and fetal wellbeing, the following should be ascertained:

- Any relevant medical and obstetric history.
- Gravida and parity.
- Estimated date of birth and placenta localisation from early ultrasound scan. Any other scan results from later in pregnancy.
- Blood group and rhesus status.
- Any vaginal loss – colour and amount.
- Any changes in movements of the fetus, position of the fetus at the last visit.
- Length, strength and regularity of contractions.
- Group B strep screen/result. Risk factors.
- Willingness to stay at home, support and coping ability, distance from hospital, transport, language constraints.
- Ascertain that the woman understands the advice she has been given.

Following a telephone discussion, if the clinician feels that a woman requires further assessment, she should be encouraged in the first instance, to attend the hospital.
The woman may also benefit from being advised to bring her hospital bags in case she is admitted.[6]

English as a second language

The provision of advice for women who may not be able to communicate in English should be considered. If during a telephone call it is not possible to communicate with the woman directly in a manner that she understands, ideally a qualified interpreter should be used during the call or she must be encouraged to attend the hospital for assessment, where a qualified interpreter can be arranged.

Although interpreters are not always available out of office hours and/or at short notice, clinicians need to be aware that using family members, carers or friends to interpret should be kept to a minimum because of potential breaches of confidentiality, conflict of interest, potential for loss of objectivity and legal liability.[7]

Question 2. What advice should a woman receive who telephones and is in suspected labour?

There is no high level evidence from which to guide practice. The following good practice points are reasonable to follow.

When women telephone in early labour, they should be given clear advice and criteria for further contact, and the rationale for this advice. The clinician must ensure that the advice given has been understood.

If the woman appears to be in the latent early phase of labour, it should be stressed that while uncomfortable, it is a normal physiological process, which may, in some situations last for up to 20 hours.

Dependent upon a woman's individual circumstances, she may initially be asked what she would prefer to do. Following some discussion, she may be advised to stay at home until she feels she requires additional support, her condition changes in any significant way, or if she feels the need to come to the hospital for any other reason. Alternatively, either the woman or the clinician may feel it is appropriate to attend the hospital immediately.

If this is a second telephone call pertaining to the same episode of labour, further information on any change in circumstances can be elicited. Either the woman or the clinician may feel it is appropriate to stay at home for longer or attend the hospital immediately.

If this is the third telephone contact pertaining to the same episode of labour, then the woman should be advised to present to the hospital for a physical assessment and on-going plans to be made.

Question 3. What should be documented as a result of a telephone consultation?

Again, there is no evidence from which to guide practice.
Each maternity service should have easily accessible documentation for each call taken.
Documentation should include:

- Whether the woman has phoned before and when
- The answers to the maternal and fetal risk questions
- The date, time, and the advice given
- The name and signature of the clinician

3centres Collaboration recommendations

- Listen to the woman's story with sympathy and concern.
- All advice is individualised according to the woman's circumstances.
- Each maternity unit should have clear, easily accessible pathways for telephone triage questions to ask and what advice should be given.
- Telephone advice imparted should be clearly documented with the date, time, printed name and signature of the clinician taking the call.
- Telephone advice forms should be centrally located and easily accessible for any subsequent calls.
- Clinicians should be adequately trained and experienced when telephone triaging.
- Qualified interpreters are the preferred option, as culture and custom can be a barrier to effective communication when family members are used as interpreters.
- The woman could be invited to attend the hospital for assessment at any time and should be invited in after three telephone calls.

Future research recommendations

Evaluation tools to assess whether telephone triage impacts upon maternal and fetal outcomes.

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Latent phase of labour

Clinical questions:

1. What is the latent phase of labour and how is it diagnosed?
2. How long does the latent phase of labour last?
3. Where is the woman, who is in the latent phase of labour best cared for?
4. What advice should be provided to women who are at home or who are sent home in the latent phase of labour?
5. If a woman is sent home, what assessments should be performed prior to her discharge?

6. What are the maternal and fetal risks for prolonged latent phase and the appropriate management strategies?

Question 1. What is the latent phase of labour and how is it diagnosed?

The latent phase of labour was described from the 1950's onwards, predominately by the work of Friedman. At that time latent phase of labour was distinguished from the active first stage of labour as 'contractions that may be painful and may be irregular in strength and frequency'.[8]

While the woman can make this diagnosis, the later additional statistical norms of cervical effacement and dilatation from 0–4 cm were added, involving a professional confirmation. This definition continues to inform clinical practice today, as there remains a dearth of high-level evidence to refute these parameters.[9]

An epidemiological review by Vahratian et al. in 2006, highlights the methodological challenges of using Friedman's progression of labour charts in contemporary clinical practice and recommends alternative methodology such as 'survival analysis' to more accurately plot the progression of labour in different subgroups.[10]

Summary. Question 1.

There is a paucity of high-level evidence for many routine practices deployed for women who are in early labour or the latent phase of labour.

Each woman and each labour are unique, necessitating an individual approach according to the woman's parity, personal circumstances, level of fatigue and ability to cope, previous experience, support network and the evolving clinical picture.

Because there are no universally agreed parameters for the latent phase of labour, it is prudent to consult with experienced colleagues who are able to exercise some clinical discretion. Management plans need to be flexible to accommodate any degree of additional surveillance and intervention as required.

Question 2. How long does the latent phase of labour last?

Friedman in 1967 identified a mean latent phase of 7.3 hours (SD = 5.5 hours) and defined prolonged latent phase as greater than or equal to 20 hours in nulliparous and 14 hours in multiparous. [11]

Later however Chelmow in 1993 defined a prolonged latent phase as over 12 hours for nulliparous women and over 6 hours for multiparous women.[12]

By pooling findings from six descriptive studies, NICE in 2007 established that the range of duration of the latent phase of labour was 1.7 hours to 15.0 hours. However, NICE concede that these figures are flawed, as they include some calculations based on standard deviations, which assumes a normal distribution, which is not the case when considering duration of labour.[13]

Summary: Question 2.

The importance of establishing the commencement time of labour, including the latent phase cannot be over-stressed. Subsequent management decisions will flow from that judgment, including a possible diagnosis of delay and a subsequent cascade of intervention. However, an accurate assessment of the commencement of the latent phase is often difficult to determine; it is a subjective assessment and diagnostic guidelines are lacking.

The evidence for stating a definitive length for latent phase is sparse, dated and equivocal, with a broad range cited in the literature from 1.7 hours up to 20 hours.

This guide is not supported by high-level evidence; Therefore, based on the assumption of an uneventful antenatal period of a healthy woman at term in spontaneous labour, with a singleton pregnancy in a vertex position, a suggested range based solely on the above

parameters, could be up to 12 hours for nulliparous women and up to 6 hours for multiparous women.

These times would not necessarily apply to women who fall outside of the above parameters e.g. post term pregnancies or a growth restricted fetus, and experienced clinical judgement is advised for these women.

Question 3. Where is the woman best cared for who is in the latent phase of labour?

Janssen et al. in 2006 reported the results of a trial involving 1459 women in early labour who were randomised to care either at home or in hospital. They reported that almost half of women admitted to labour wards were not in active labour. [14]

A Cochrane review in 2001 reported on only one small trial of high quality. [15]
The authors of this trial concluded that by delaying hospital admission until active labour had been established, women were less likely to receive intrapartum oxytocics, require less analgesia, and felt a greater sense of control.[16]

In 2008 Hodnett et al conducted a randomised controlled trial to determine if a complex nursing and midwifery intervention in hospital labour assessment units would increase the likelihood of spontaneous vaginal birth and improve maternal and neonatal outcomes.

They deduced that a combination of structured care plus strict adherence to a policy of delayed admission to the labour ward until clinically indicated, may yield a modest increase in the number of spontaneous vaginal births. Importantly, taking time to support women around the onset of labour had a positive effect on their experiences of labour. [17]

In 2000 Walsh also concluded that the labour ward is not an appropriate environment for women who are in the latent phase of labour.[18]

Summary. Question 3.

There was a moderate amount of evidence to support delaying admission to labour wards, which would reduce the need for analgesia and intervention. As a preferable option, some favoured an assessment ward or 'holding' unit where women were able to rest, receive analgesia and felt more secure in the hospital environment. Advice to stay or return home must be based on the woman's preferences and personal circumstances.

Question 4. What advice should women receive at home or who are sent home, and in the latent phase of labour?

Lauzon and Hodnett conducted a Cochrane systematic review of the utility of an antenatal education program to inform women on how to self-diagnose labour in 2009. They concluded that there is insufficient evidence to evaluate the use of a specific set of criteria for self-diagnosis of active labour.[19]

If conservative management is recommended, it is important that the woman has a good support network around her at this time. She should continue normal activity, eat a light diet, ensure adequate hydration, take a warm bath, and be advised to rest.[20]

Over-the-counter analgesia has a high safety profile in pregnancy however, the use of benzodiazepines in early labour has in some cases been shown to cause the 'floppy infant syndrome', characterised by central respiratory depression, hypothermia and poor sucking in the neonate.[21] This effect is likely to be potentiated by combining sedatives such as temazepam with stronger analgesia such as Panadeine Forte® (paracetamol + codeine).

Summary. Question 4.
Maintain normal levels of activity, continue with a light diet, ensure good hydration, take a warm bath, rest as much as is needed, and take simple over the counter analgesia such as paracetamol.

Advise the woman against mixing stronger analgesia such as Panadeine Forte® with sedatives such as temazepam.

The woman must be reassured that she can call or return to the hospital at any time.

Question 5. If a woman is sent home, what assessments should be performed prior to discharge?

There is little evidence to guide practice on the use of routine observations or examinations on presentation of women in suspected labour.[13]

Not all women will want to return home and each case should be individualised, taking into account her wishes, ability to cope, transport, and support. It is important that the woman and her family are made to feel welcome to return to the hospital at any time if her condition changes or she feels anxious. [13]

Summary. Question 5.
Regardless of whether the woman returns home or stays in the hospital, in the absence of evidence and in order to assess maternal and fetal well-being, it would be reasonable to conduct some baseline observations such as:

- Temperature, pulse, blood pressure, and urinalysis
- Ascertain if there has been any vaginal loss, if so, its colour, and the amount
- Ascertain the frequency of contractions experienced and a palpation for the length, strength, and regularity of contractions.
- Discuss the woman's ability to cope if she returns home
- Enquire as to fetal movements; check fetal heart rate by way of at least a full minute of auscultation during and after a contraction or by cardiotocograph (CTG)

After a period of assessment the woman could be offered a vaginal examination to assess cervical effacement and any dilatation. If the woman's assessment is normal and latent phase of labour is confirmed by vaginal examination, she will be encouraged to return home until labour is established.

Question 6. What are the maternal and fetal risks for prolonged latent phase and the appropriate management strategies?

The significance and management of prolonged latent phase is controversial. Some believe that prolonged latent phase is related to an underlying labour abnormality and should be actively managed by rupturing membranes and commencing oxytocics. [22]

Others recommend a more conservative approach with delayed admission, analgesia, and rest. Friedman believed both oxytocin and therapeutic rest were equally safe and effective for prolonged latent phase, but preferred heavy sedation such as the use of morphine because it allowed the woman to rest before the onset of active labour, thus avoiding unnecessary inductions. Women would often sleep for 6-10 hours and invariably awake in established labour. [11]

In 1993 Chemlow et al. found that 713 (6.5%) of 10979 women experienced a prolonged latent phase and that it was associated with subsequent labour abnormalities and increased caesarean section rates. [12]

There is little high level evidence to support the following to enhance the onset of labour:

- Castor oil and enemas only serve to dehydrate and cause uterine irritability.[23]
- Nipple stimulation has been shown to enhance uterine activity when the cervix has already undergone some changes, it is not advocated for women in the latent phase of labour. [24]
- Semen contains prostaglandins, which is thought to stimulate the cervix during sexual intercourse and induce labour. There is insufficient evidence to promote this activity.[25]
- The evidence suggests that sweeping of the membranes promotes the onset of labour and decreases use of other methods of induction of labour however; its usefulness in the latent phase of labour has not been established. [26]

Summary. Question 6.

Early admissions to hospital and interventions during the latent phase do not appear to be warranted however, they can be justifiable dependant upon individual circumstances or once 'normal parameters' for a latent phase have been exceeded.

The risk of continuing with conservative management, which may exacerbate fatigue, distress, dehydration, fever, uterine contractility and fetal reserves, needs to be weighed against the risk of unnecessary interference, which may increase the cascade of intervention and lead to caesarean section.

Each woman and her plan of management require thoughtful consideration. The agreed plan should be based upon the woman's preferences along with the clinical situation.

Many units adopt a policy of advising women to come to the hospital for assessment or admission if they are in the latent phase of labour and have made three calls or presentations.

3centres Collaboration recommendations
▪ The latent phase can be defined as: Contractions that may be painful and regular or could differ in strength and frequency. The process of cervical effacement has begun, which may also include some cervical dilatation.
▪ The average length of a latent phase for a spontaneous labour at term, with a fetal vertex position, in a healthy woman and fetus – An estimate is 12 hours for nulliparous women (but could be as long as 20 hours) and 6 hours for multiparous women.
▪ Place of care is ideally at home unless individual preference or circumstance dictate otherwise.
▪ Women should be advised to maintain normal levels of activity, continue with a light diet, ensure good hydration, take a warm bath, take simple over the counter analgesia such as paracetamol and advised against mixing stronger analgesia such as Panadeine Forte® (paracetamol + codeine) with sedatives such as temazepam, rest as much as is needed, call or return to the hospital at any time.
▪ Baseline observations will include - Assessment of maternal and fetal wellbeing and a vaginal examination.
▪ Where the latent phase is considered prolonged, experienced clinicians should be consulted and a plan made with the woman as to whether she return or remain at home, be admitted to the hospital or whether an induction of labour is commenced.
▪ If a woman has telephoned or presented to the hospital 3 times in the current latent phase, attendance at the hospital is advised for assessment and on going plans made.

Future research recommendations

Parity specific latent phase time parameters. Latent phase management guidelines.

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First stage of labour definition, duration and delay

Clinical questions:

1. How is the established first stage of labour defined?
2. What is the average duration of the first stage of labour for nulliparous and for multiparous women?
3. What is delay in the first stage of labour, what are the risks of delay and how is it managed?

Question 1. How is the established first stage of labour defined?

Friedman, in the 1950's first described a difference between latent and active phases of labour. Active first stage of labour was said to commence with effacement and dilatation of the cervix measuring from 2-2 ½ cm onwards, accompanied by regular painful contractions.[8]

These criteria were based on a preliminary study of only 100 women but have continued to form the basis for the current definition of labour commencement to this day.

In the NICE 2008 intrapartum care guideline, the authors explored various studies that investigated the onset of labour. The guideline development group concluded that from the evidence available, the onset of the active phase of labour was from progressive cervical effacement and dilatation of 4cm onwards, with regular painful contractions lasting until full cervical dilation of 10cm.[27]

A more contemporary systematic review by Neal et al. in 2010 concluded that labour for nulliparous women began with a mean cervical dilatation of 3.7cm +/- 0.4cm at the diagnosis of 'active stage'[9]

Summary. Question 1.

The importance of establishing the commencement time of labour cannot be over-stressed, as subsequent management decisions will flow from that judgment, including a possible diagnosis of delay and a subsequent cascade of intervention. However, an accurate assessment of the commencement of the active stage is often difficult to determine; it is a subjective assessment and diagnostic guidelines are lacking.

However cervical dilatation of 3-4 cm with cervical effacement in nulliparous women, is likely to indicate the onset of the active phase of the first stage of labour

Question 2. What is the average duration of the first stage of labour for nulliparous and for multiparous women?

Since the Friedman sigmoid curve for labour progress of an anticipated 1cm per hour was introduced in the 1950's, new research has emerged to suggest that 1cm/hr is not an accurate description of progress in normal labour[8]

Neal et al. in their systematic review of 18 studies and over 7000 nulliparous women, concluded that the cervix dilates at a rate of 1.2cm per hour and therefore existing defined 'normal' rates may be misleading. The authors call for revised active labour rate expectations.[9]

In the NICE 2008 intrapartum care guideline; the authors explored various studies that investigated the duration of labour. In their pooled analysis of 6 descriptive studies of labour duration in both nulliparous and multiparous women, the following table depicts lower and upper values for both groups of women.[27]

Ranges for duration of stages of labour. Adapted from NICE Intrapartum care 2007

	Lower value	Upper value
Nulliparous		
Latent phase	1.7 hours	15 hours
Active first stage	1 hour	19.4 hours
Multiparous		
Latent phase	Not studied	Not studied
Active first stage	30 minutes	14.9 hours

Summary. Question 2.

Each labour is unique and varies between nulliparous and multiparous women. The duration of a normally progressing labour may not necessarily follow the linear curve of the partogram.

Question 3. What is delay in the first stage of labour and how is it managed?

In the 2007 NICE intrapartum care guideline; the development group acknowledge that traditional dilatation rates do not take into account parity, rotation and descent of the fetal head and uterine contractility.

However, their recommendation on the definition of delay in the first stage of labour is:

" A diagnosis of delay in the established first stage of labour needs to take into consideration all aspects of progress in labour and should include:

- Cervical dilatation of less than 2 cm in 4 hours for nulliparous women
- Cervical dilatation of less than 2 cm in 4 hours or a slowing in the progress of labour for multiparous women
- Descent and rotation of the fetal head
- Changes in the strength, duration and frequency of uterine contractions.[27]

Management of delay

The diagnosis of labour delay must correlate with an accurate assessment of the onset of active labour, as diagnosis of delay and subsequent management decisions will flow from that.

In 2009 in a retrospective cohort study, Cheng et al. demonstrated a correlation between the duration of the first stage of labour and adverse maternal outcomes including chorioamnionitis, instrumental or caesarean birth, perineal trauma, and post partum haemorrhage in nulliparous women. The 50th percentile duration of labour was 10.5 hours with the 95th percentile being 30 hours. There were no reported adverse neonatal outcomes.[28]

In 2009 Kjaergaard et al. conducted a cohort study of 2810 women in an attempt to estimate the incidence of delay among nulliparous women without apparent co-morbidity, and to examine maternal and fetal short-term outcomes after augmentation for delay.

The authors deduced that 14.1% of women experienced delay in the first stage of labour, which was defined as the cervix dilating <0.5cm assessed over four hours from 4cm dilatation.

The outcomes were that women with delay treated by augmentation had more caesarean and ventouse deliveries, more non-clear amniotic fluid, more post-partum haemorrhage and their babies were more often given low one-minute Apgar scores as compared to women giving birth without a diagnosis of delay. It is unclear as to whether the adverse maternal and neonatal birth outcomes were related to the cause of delay or to augmentation of the labour.[29]

Amniotomy

A Cochrane review by Wei et al. in 2009 involving 10 trials and 7653 women, assessed the effects on women who had established delay in labour, of early augmentation with amniotomy plus oxytocin therapy. The caesarean birth rate and other indicators of maternal and neonatal morbidity were analysed.

The authors found there to be a modest decrease in the caesarean section rate and a reduced time from admission to birth among the amniotomy/oxytocin groups. Due to the heterogeneity between the studies, the severity of delay to justify interventions remains to be defined. [30]

In contrast to the Wei evidence, Smyth et al. conducted a Cochrane review in 2011, which included 15 studies involving 5583 women. The authors state that amniotomy showed no shortening of the length of first stage of labour that has started spontaneously, and a possible increase in caesarean section in the amniotomy groups.

The authors concluded that routine amniotomy is not recommended for normally progressing labours or in labours which have become prolonged.[31] [Also see 'Liquor during the first stage of labour']

Summary. Question 3.

According to the NICE 2007 Intrapartum Care Guidelines; women should be informed that active labour begins from approximately 4cm cervical dilatation in the presence of regular painful contractions. On average, a first labour will last for approximately 8 hours and will not usually exceed 18 hours. For subsequent labours, it will last for approximately 5 hours and will not usually exceed 12 hours.

There is no consensus for what constitutes labour delay, and the challenge for health care clinicians is to resist unnecessary early intervention and to determine whether a period of 'slow' progress in labour has become pathological and therefore justifies intervention, or is a variation in the normal physiological process leading to birth.

There is conflicting evidence as to whether performing an amniotomy, may assist with labour delay.

3centres Collaboration recommendations

- First stage is defined as: Progressive cervical effacement and dilatation from 3-4cm onwards, with regular painful contractions lasting until 10cm dilatation.
- Duration: nulliparous women up to 20 hours. Multiparous women up to 15 hours
- Diagnosis of delay is not based on duration alone. The whole clinical picture includes: Strength and frequency of contractions, fetal descent and rotation, cervical dilatation, and maternal and fetal well-being must all be considered.
- Research is divided as to whether amniotomy shortens labour or confers any benefits in cases of delay. Experienced clinicians should be consulted and the evidence discussed with the woman.

Future research recommendations

Contemporary, parity specific algorithms for labour progress.

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Maternal and fetal observations on admission and during the first stage of labour

Clinical questions:

1. What are the recommended clinical assessments performed on admission in established labour or the initial presentation for labour care?
2. What routine maternal observations are appropriate during the first stage of labour?
3. How frequently should routine maternal observations be carried out?
4. What fetal surveillance should be performed in the first stage of labour?
5. What routine documentation should be recorded?

Question 1. What are the recommended clinical assessments performed on admission in established labour or the initial presentation for labour care?

It is common practice to gather history, perform observations and examine a woman who presents in suspected labour; with the aim of assessing maternal and fetal health, assessing progress in labour and evaluating the woman's needs for labour. However there is very little evidence to guide clinicians in this initial contact. The NICE 2007 Intrapartum Care Clinical Guideline recommends studies to examine the clinical efficacy of the initial contact and observations/examinations carried out.

Clinicians are encouraged to listen to the woman's story. Specific questions related to the woman's presentation and associated symptoms suggestive of labour, such as the character of contractions, nature of liquor or other vaginal losses, and fetal movements; may be of use. [27]

When a woman presents in suspected labour, the clinician needs to be able to make management decisions. Therefore, information is required regarding the woman's expected due date (EDD), the history of the pregnancy and any complications, check for any risk factors for group B streptococcus or a pathology screening result, past obstetric history, past medical and surgical history, current medications, allergies and social history.

Clinical notes made during the pregnancy need to be readily accessible; medical records access or a hand held record might be useful. There is no high quality evidence to guide the clinician in seeking the most useful information, the best way to do this or how this information directly affects maternal or neonatal outcomes.

Other routine practices, including recording maternal observation and abdominal palpation, although lacking in direct evidence, are appropriate clinical practice.

It seems reasonable to only take blood for a group and save for women who are at risk of obstetric haemorrhage. Services may need to consider the following; availability of cross matching services, cross-matched blood and the presence of unusual antigens in the women's blood.

Question 2. What routine maternal observations are appropriate during the first stage of labour?

Maternal observations are carried out regularly during labour, however there is no evidence that links outcomes of the mother or fetus to the type of observations taken or the frequency of these observations.[27]

Question 3. How frequently should routine maternal observations be carried out?

Common observations are the following; pulse every half hour, blood pressure every two hours and temperature every four hours. If any of these observations are found to be abnormal the frequency of the observations needs to be reassessed.

Consultation with an appropriately skilled clinician is required when deviations from normal maternal observations are noted.

Question 4. What fetal surveillance should be performed in the first stage of labour?

Assessment of fetal wellbeing should be performed according to RANZCOG Intrapartum Fetal Surveillance Clinical Guidelines. [32]

Question 5. What routine documentation should be recorded?

The partogram (also known as a partograph) is a tool that is used widely to document the woman's progress in labour, in a pictorial manner. The partogram records cervical dilatation and may include station of presenting part, contraction frequency and strength as well as maternal and fetal observations.

There is no specific evidence to guide what is recorded on the partogram. The World Health Organisation (WHO) has published several partograms, which might be used or adapted for local use. (See appendix 1.)

Depending on the format of the partogram, it may be started on admission (the partogram documents latent first stage) or once labour is established which ever comes first. [27]

The primary aim of the partogram is to provide an early warning to clinicians, of a woman who is at risk of prolonged or obstructed labour; depending on the other information recorded on the partogram deviations in maternal or fetal wellbeing might also be recognised. In the developed world, partograms have become used more as a pictorial representation of the woman's labour and an important centralised point to document maternal and fetal observations as well as progress in labour.[33]

Action and alert lines have been used on partograms to help guide the timing of interventions to prevent an obstructed labour. The NICE 2007 guideline suggests that if an action line is used on the partogram then a four hour action line be used, in accordance with the WHO recommendation.[27]

The Lavender Cochrane review looked at several comparisons of action lines, two hour versus four hour, two hour versus three hour and three hour versus four-hour action lines. The conclusion was that when the data was combined the placement of the alert line led to little difference in caesarean section rates and/or other maternal outcomes. [34]

It is expected that use of a partogram should improve outcomes for the woman and the fetus. The NICE 2007 guideline noted that the evidence regarding the use of the partogram to improve outcomes has come mainly from low income settings and that the use of an action line increases the vaginal birth rate and reduces the maternal morbidity.

NICE concluded that the benefits of a pictorial summary of labour progress would be applicable to a high-income country such as the United Kingdom.[27]

However there are two significant articles since the publication of the NICE 2007 intrapartum care guideline.

The Cochrane review by Lavender et al., in 2008; which reviewed five studies, (three of which are referenced in the NICE 2007 guideline), found that there was no evidence of a difference in maternal or fetal outcomes between the use of a partogram compared with no partogram. Their conclusion, based on the review findings was that they could not recommend the routine use of the partogram as part of standard labour management and care. They recommended that further evidence is required to establish the efficacy of the partogram.[34]

In 2009, Soni critiqued the Lavender Cochrane review and concluded on a middle ground, suggesting that it was "not advisable to recommend any change in the current routine use of partogram or the use of a specific type of partogram" and confirming the need for further research. [35]

3centres Collaboration recommendations
Maternal Initial Assessment and Ongoing Observations ▪ Clinicians are encouraged to listen to a woman's story and promote free communication. ▪ Good practice includes gathering history, performing observations and examining a woman at her first presentation. ▪ Clinical information may be gathered from the woman or clinical notes, which ever is the most appropriate ▪ Collection of blood for a group and save should be reserved for high-risk women and reflect local resources. ▪ The use of routine maternal observations need to be critically reviewed, reflect local resources and would affect care given to the women, if an abnormality was found.
Fetal Surveillance ▪ Fetal wellbeing should be performed according to the RANZCOG Intrapartum Fetal Surveillance Clinical Guidelines
Documentation and Use of a Partogram ▪ Further evidence is required about the use of partograms and the effect on maternal or neonatal outcomes. Until that evidence is available it would not be justifiable to abandon the routine use of the partogram.

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Bladder care / routine urinalysis during the first stage of labour

Clinical questions:

1. What is the effectiveness of frequent bladder emptying on the outcomes of the first stage of labour?
2. What is the utility of routine urinalysis for women in labour?

Question 1. What is the effectiveness of frequent bladder emptying on the outcomes of the first stage of labour?

The 2007 NICE intrapartum guideline group were unable to source any research that demonstrated any assessment of bladder care that affected labour outcomes.[27]

However, two years later in 2009 the results of a large prospective study was published on the incidence of urinary and faecal incontinence following prolonged periods during labour without emptying the bladder.

The authors followed the 516 respondents at six weeks, six months and one year following the birth. The study showed that those respondents who did not have their bladder emptied for more than four hours prior to the start of the second stage of labour, were 1.94 times more likely to report 'any' urinary incontinence and 2.36 times more likely to report stress incontinence at one year postnatally.[36]

Question 2. What is the utility of routine urinalysis for women in labour?

Research into the utility of conducting urinalysis during labour is virtually nil, but it has been part of routine clinical practice for decades.

In 2008, Toohill et al. conducted a Cochrane systematic review that identified six trials concerning ketosis during labour and interventions that may affect outcomes. All six trials were excluded due to extreme heterogeneity within and between the studies and the conclusion was that there was no information on which to base practice in the treatment of women with ketosis during labour.[37]

Summary. Question 2.
No evidence found to support or refute the use of routine urinalysis during labour.
No evidence to support treatment in the presence of ketonuria in labour.

From the limited evidence, it would be reasonable to encourage the woman to void every 3-4 hours during the first stage of labour. Physiologically, this is thought to aid descent of the fetus, minimise the risk of urine retention and to reduce damage to the pelvic floor.
Further, there is no evidence that the presence of ketones in urine is affected by interventions.
[Also see Pharmacological analgesia, first stage of labour; Regional analgesia/anaesthesia.]

3centres Collaboration recommendations

- Encourage women to void every 3-4 hours during labour.
- Encourage clear oral fluids during labour. Isotonic drinks in the presence of ketonuria
- Services are encouraged to develop post partum bladder care guidelines.

Future research recommendations
Future trials should examine the effects of no interventions and different types of intravenous and oral fluids for women with ketonuria during labour.

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Eating and drinking during the first stage of labour

Clinical questions:
1. What is the effect of restricting or encouraging fluids and nutrition on labour outcomes?

Question 1. What is the effect of restricting or encouraging fluids and nutrition on labour outcomes?
The practice of restricting flood and fluids in labour was promulgated by the work of Mendelson in the 1940's. His team demonstrated an association between maternal morbidity during general anaesthesia in women undergoing caesarean section and those who had eaten and aspirated small particles of food. This subsequently led to widespread policies of food and fluid restriction during labour.

In the 2007 NICE 2007 Intrapartum Care Guidelines the authors recommend that women may drink during established labour and be informed that isotonic drinks may be more beneficial than water in preventing or treating ketosis without increasing gastric acid.
Women may eat a light diet in established labour unless they have received opioids or they develop risk factors that make a general anaesthetic more likely.[27]

This recommendation is further supported in a Cochrane review in 2010 to determine the benefits and harms of oral fluid or food restriction during labour. The authors identified five studies (3130 women). All studies looked at women in active labour and at low risk of potentially requiring a general anaesthetic. One study looked at complete restriction versus giving women the freedom to eat and drink at will; two studies looked at water only. The reviewers state that as there is neither benefit nor harm, women who are at low risk of complications, should be free to eat and drink as they wish during labour.[38]

In 2010 King et al. conducted a comprehensive review of the literature pertaining to factors that affect women's oral nutrition in labour. They found that little evidence exists to support the continuance of restrictive practices around oral nutrition in labour for all women. Women's choice is impacted by health practitioners' opinions, experience and practice methods and policy (or lack thereof). Policies were found not to be reflective of current evidence.[39]

In 2011 the European Society of Anaesthesiology produced guidelines for perioperative fasting in children and adults. As in the NICE recommendations, they state that for low risk women in active labour "in view of the almost negligible incidence of deaths from aspiration, low-risk women could consume low-residue foods (such as biscuits, toast or cereals) during labour. In addition, when deciding whether or not women should eat during labour, the use of parenteral opioids should also be considered because of their profound delay on the rate of gastric emptying."[40]

Summary. Question 1.
The practice of withholding food and fluids in labour is widespread and based on the work of Mendelson in the 1940's.

Pooled results in systematic reviews and international guidelines have demonstrated that offering a light diet and fluids in labour has no benefit, but shows no harm and women should be allowed to eat and drink if they so desire.

Conversely, in practice, women often do not feel they can eat during active labour and their wishes to refrain from eating should be supported.

Attention should be paid to the reduction in gastric emptying in women who have received opioids.

3centres Collaboration recommendations

- Each woman in labour should eat a light diet and drink water or isotonic drinks, as she desires.
- In the presence of ketonuria isotonic drinks to combat ketosis, are preferable to water.

Future research recommendations
Clear policy directives on nutritional intakes in labour.

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Hygiene during the first stage of labour

Clinical questions:
1. What effective personal and environmental hygiene strategies are appropriate to enhance maternal well-being and to protect women, babies and healthcare professionals?

Question 1. What effective personal and environmental hygiene strategies are appropriate to enhance maternal well-being and to protect women, babies and healthcare professionals?

Vaginal cleansing prior to examination: The NICE 2007 guideline[27] reported on one systematic review that included three randomised controlled trials comparing chlorhexidine vaginal douching during labour with sterile water as a placebo control. They found no evidence to support the hypothesis that vaginal washes with chlorhexidine prevent maternal and neonatal infections (excluding Group B streptococcus and HIV), although data suggest a small

reduction in the incidence of endometritis.[41]
NICE recommend that tap water is to be used if required prior to vaginal examination

Double gloving and arm sleeves: The NICE 2007 guideline[27] reported on two RCTs conducted in Thailand comparing the use of double gloves with single gloves while performing an episiotomy. Outcome measures were perforation rates only. They concluded that wearing two gloves appeared to reduce perforation rates in inner gloves compared with single gloving. However, caution needs to be taken in interpreting the results, as there was no concealment.[42, 43] There is insufficient evidence on the use of sterile arm sleeves in preventing contamination.

NICE recommend that routine hygiene measures taken by staff caring for women in labour, including standard hand hygiene and single-use sterile or non-sterile gloves, are appropriate to reduce cross-contamination between women, babies and healthcare professionals.

Summary. Question 1.
Maternal and neonatal mortality due to overwhelming sepsis is a rare event today however; Invasive procedures during labour have the potential to introduce pathogens. In order to minimise the risk of infection and reduce the spread of blood borne diseases, Infection control policies in all institutions should be rigorously adhered to.

General hand hygiene practices and the use of personal protective clothing such as an apron, eye shields and the use of sterile or non-sterile single gloves should be commonplace during examinations and/or birth. Double gloving could be adopted if circumstances dictate.

3centres Collaboration recommendations

- The use of tap water for vulval cleansing if required, prior to vaginal examination.
- Good hand hygiene and adherence to local infection control policies.
- During vaginal examinations and birth, the research into the use of sterile-vs-non-sterile gloves is equivocal. 3C's suggest sterile is preferable and personal protective clothing is recommended.
- The use of double gloving is not recommended unless if circumstances dictate.

Future research recommendations
Hygiene practices during labour and birth would benefit from further research.

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Vaginal Examinations during the first stage of labour.

Clinical questions
1. What is the procedure for a vaginal examination?
2. When should a vaginal examination be performed?
3. Are there any special circumstances for vaginal examinations?
4. What documentation needs to be completed following a vaginal examination?

Question 1. What is the procedure for a vaginal examination?
Vaginal examinations are performed during the care of a woman before and during labour. As with any procedure the woman needs to have an explanation as to why the examination has been offered, what will happen during the procedure and the likely outcome, risks or benefits. Consent for the procedure should be obtained.

The clinician who is performing the examination needs to be sure that it is necessary and that it will aid the decision making process. A woman in labour may find a vaginal examination reassuring as it provides an insight into her progress and may help to encourage her.

Examination findings need to be explained to the woman sensitively and in a way in which the woman will understand.[27]

The woman's privacy, dignity and comfort need to be ensured. Any distress with vaginal examinations needs to be removed or minimised. Women who have been exposed to sexual violence or trauma may have further requirements when having a vaginal examination. Ideally a discussion around these topics is performed during pregnancy care.[27]

Procedure

Standard hand washing and single use sterile gloves are appropriate for a vaginal examination. If required the perineum may be cleansed using tap water, prior to the examination.
The vaginal examination should be performed only in association with an abdominal palpation. The person conducting the examination is checking for maternal components:

- genital tract anatomy
- cervical dilation
- effacement
- application of cervix to presenting part

and checking for fetal components

- presenting part
- descent in relation to maternal landmarks, i.e. Station
- position
- caput and moulding

Other findings, such as vaginal losses will also give important clinical information.

The procedure should be performed efficiently with the clinician being adequately trained and/or supervised in the technique. There is no place for a rectal examination to assess progress in labour.

Many women appreciate a description of what is happening during the examination and the opportunity to have the findings of the examination explained to them. Clinicians performing vaginal examinations need to appropriately communicate the findings directly after the completion of the procedure.[27]

Summary. Question 1

Routine hand washing and the use of sterile, single use gloves are appropriate. Tap water for cleansing the perineum if required. Vaginal examination records features of the cervix, fetus and descent. Communicate with the woman regarding findings of the vaginal examination.

Question 2. When should a vaginal examination be performed?

A vaginal examination should not be performed in a number of circumstances, for instance when there is pre labour rupture of membranes or a risk of placenta praevia.

For some women it may be unclear if they are in established labour and a period of observation will help to determine the timing of the first vaginal examination.

A vaginal examination is an appropriate part of the labour assessment process but should not be limited to a set time frame. However an initial examination should be performed within 4 hours of admission. The information gained from the vaginal examination at this point may help the woman decide if she wishes to return home or remain at the birthing facility.[27]

The frequency of vaginal examinations in established labour should be individualised. The NICE intrapartum care 2007 clinical guideline cites two small studies, of low evidence level, that found there was no difference in the duration of labour related to the frequency of vaginal examinations.[27]

There may be an association with increased neonatal and maternal sepsis, for women with pre-labour rupture of membranes and frequent vaginal examinations. The NICE 2007 intrapartum care guideline recommends four hourly vaginal examinations unless there is concern with the progress of labour or in response to the woman's wishes. Vaginal examinations should only be performed if the result will help to determine the care offered to the woman.[27]

During the active second stage of labour NICE 2007 Intrapartum Care Guidelines recommends vaginal examinations hourly or in response to the woman's wishes. However the guidelines do not include a review of evidence for this recommendation.

When delay in either the first or second stage of labour is diagnosed, the frequency of vaginal examinations needs to be guided by the intervention performed.

Summary. Question 2

Frequency of vaginal examinations needs to be individualised. The first is usually within four hours of admission to hospital and four hourly thereafter, unless the clinical picture changes.
In second stage of labour, NICE recommend hourly vaginal assessments.

Question 3. Are there any special circumstances for vaginal examinations?

Female genital mutilation (FGM) is the term used to refer to the removal of part, or all, of the female genitalia. The most severe form is infibulation and for these women, vaginal examinations can be difficult and the information gathered incomplete. It is important to discuss this with women prior to labour.[27]

Question 4. What documentation needs to be completed following a vaginal examination?

Findings of vaginal examinations need to be clearly documented. It is important to document the fetal heart rate following vaginal examinations as the examination may affect the fetal heart rate. Commonly a partogram is used to document fetal heart rate and vaginal examinations.[27]

3centres Collaboration recommendations

- The reason for a vaginal examination should be given and consent obtained.
- Clear and sensitive communication about the findings of a vaginal examination is essential.
- Standard hand washing and the use of sterile gloves are appropriate. The perineum may be cleansed with tap water if required.
- Vaginal examination findings include cervical and fetal findings as well as descent.
- On first presentation in labour, a vaginal examination establishes a baseline. It is expected that the first examination is performed within 4 hours of admission. Where there is doubt if the woman is in established labour an earlier examination may be of use.
- Subsequent vaginal examinations are offered every 4 hours in established labour, but this needs to individualised. Vaginal examinations should only be performed if the result will help to determine the care offered to the woman.
- Women with FGM need to discuss the difficulties and limitations of vaginal examination, preferably prior to labour.
- Document the fetal heart rate following vaginal examination.

Liquor during the first stage of labour

Clinical questions

1. What is the clinical significance of meconium stained liquor?
2. What is the clinical difference between significant meconium staining or light meconium staining?
3. Does identification and management of meconium stained liquor affect outcomes?
4. Who should be present for the birth when a woman has meconium stained liquor?
5. Does identification and management of blood stained liquor affect outcomes?
6. Does identification and management of oligohydramnios affect outcomes?
7. Does identification and management of polyhydramnios affect outcomes?
8. Does performing an amniotomy affect neonatal outcomes?

Question 1. What is the clinical significance of meconium stained liquor?

Amniotic fluid is the substance that is produced throughout gestation from various sources. During late gestation the main sources of amniotic fluid are fetal lung secretions and urine. The appearance of the amniotic fluid can give an indication of fetal condition.

Meconium is a thick black green substance that is found in the fetal intestine. It is thought to be an accumulation of debris that forms the first fetal or neonatal bowel motions. Meconium stained liquor (MSL) occurs when the fetus passes meconium in utero, this occurs in about 20% of term pregnancies.[27] Passage of meconium occurs more commonly with advancing gestation, in particular post-term births; there is also an association with fetal hypoxia.[44]

The appearance of the amniotic fluid can be used to guide care during labour. Amniotic fluid may not be visible, despite known spontaneous or artificial rupture of the membranes. The clinician can reconfirm the rupture of membranes, by artificial rupture of membranes, but only at the most appropriate interval. If there is still no amniotic fluid evident, there may be oligohydramnios or thick meconium stained liquor. This puts the fetus at higher risk of adverse outcomes and the labour should be managed accordingly.[44]

There are no standardised methods for detecting or grading the degree of MSL. There is also variation between intra-observer and inter-observer detection of MSL.

There is a linear association between the thickness of MSL and abnormal fetal heart rate patterns during labour, low Apgar scores and risk for caesarean section birth. [45]

Summary. Question 1

MSL may be a normal finding or may be associated with hypoxia or a post-term fetus. Minimal liquor or heavily meconium stained liquor is more likely to be associated with adverse fetal outcomes.

Question 2. What is the clinical difference between significant meconium staining or light meconium staining?

The predictive value of MSL for fetal distress or compromise is low.[46] For fetuses 36 weeks or more in gestation with MSL, there is an absolute risk of 12 per 100 births for adverse outcomes; such as Apgars less than 7 at 1 and 5 minutes of life, transfer to a neonatal intensive care unit or early neonatal death. [44]

MSL may indicate a fetus that is at risk of hypoxia. There is a significant link between neonatal encephalopathy and MSL. There are mixed findings regarding the risk of cerebral palsy or death and MSL.[47]

A hypoxic fetus attempts breathing movements or gasping in utero that leads to the fetus aspirating MSL. Aspiration of MSL, leads to the release of cytokines and other vaso-active substances within the neonatal lung. This may cause a mild through to life threatening respiratory distress, known as Meconium Aspiration Syndrome (MAS). MAS occurs in approximately 5% of all fetuses exposed to meconium stained liquor[48] and accounts for about 2% of perinatal deaths.[27]

Treating the women with antibiotics intrapartum, when the only indication is MSL, does not reduce neonatal sepsis or neonatal intensive care admission associated with MSL.[49]

Because the consequences of MSL for the fetus are unpredictable and possibly severe, continuous intrapartum fetal surveillance should be used as per the RANZCOG Intrapartum Fetal Surveillance Clinical Guidelines.[32] These guidelines recommend the use of continuous electronic fetal surveillance in the presence of MSL and do not discriminate between types of meconium.

Summary. Question 2.
Consequences of MSL are unpredictable, ranging from none to severe. Continuous intrapartum surveillance, with fetal blood sampling equipment and suitably trained personnel where available, will assist in providing care for women in labour with meconium stained liquor.

Question 3. Does identification and management of MSL affect outcomes?
MSL might be avoided by decreasing the length of labour, as the likelihood of MSL increases as the duration of labour lengthens.[27] Methods of shortening labour might be considered in order to decrease the risk of meconium passage.
[Also see "The first stage of Labour, duration and Delay" Question 3 What is delay in the first stage of labour and how is it managed?]

When there is MSL, it has been proposed that shortening the length of labour may be of benefit. There is no high level evidence to support this.

Amnioinfusion does not improve outcomes for the neonatal born through MSL and cannot be recommended in a setting with standard intrapartum surveillance.[27, 50]

Summary. Question 3.
Avoiding MSL by shortening labour requires further research and when MSL is present, shortening the length of the labour is of uncertain benefit.

When MSL is present in labour, amnio-infusion is not currently recommended, as there is no evidence to suggest there is an improved outcome in the fetus exposed to MSL.

Question 4. Who should be present for the birth when a woman has MSL?
A clinician trained in neonatal resuscitation should be present at the birth of a neonate exposed to MSL.[27]

Suction to the neonate's mouth and pharynx before the birth of the shoulders does not improve outcomes of neonates born through MSL.
A vigorous infant, born through MSL, requires standard care only. [27, 51]

If the infant is not vigorous, a clinician who is trained in neonatal intubation may consider suctioning the mouth, pharynx and inspecting the trachea, once the infant is born. If there is no one at the birth that is able to perform neonatal intubation and the neonate is not vigorous, place the infant under the radiant warmer, avoid stimulation, apply suction to the mouth and pharynx and commence positive pressure ventilation.[51]

Summary. Question 4.
Personnel skilled in neonatal resuscitation need to be present at the birth of the neonate exposed to MSL. Suction of the mouth and pharynx is used only in non-vigorous neonates.

Question 5. Does identification and management of blood stained liquor affect outcomes?
Blood stained amniotic fluid may indicate placental separation, or rarely, fetal bleeding from a vasa praevia, and is not considered a normal finding. At a minimum, continuous electronic fetal monitoring is required,[32] along with involvement of an experienced clinician.

Question 6. Does identification and management of oligohydramnios affect outcomes?
Amniotic fluid volume fluctuates throughout gestation and needs to be considered in relation to gestational age. There is no standard definition of oligohydramnios. Various ultrasound measures are commonly used, including single deepest pool and amniotic fluid index (AFI). As a general guide, practice has been to consider oligohydramnios as an AFI of <5cm.

Oligohydramnios may be identified in the antenatal period; either clinically or with ultrasound confirmation; or intrapartum if minimal liquor is seen during spontaneous or when artificially rupturing the membranes.

Oligohydramnios may be associated with intrauterine growth restriction, fetal compromise or post term pregnancy. [52] Suspected oligohydramnios is an indication for continuous electronic fetal monitoring[32]

Question 7. Does identification and management of polyhydramnios affect outcomes?
There is no standard definition of polyhdramnios. Various ultrasound measures are commonly used, including single deepest pool and AFI. As a general guide, practice has been to consider polyhydranios as an AFI of >25cm. Polyhydramnios can be a marker for pregnancy complications such as diabetes or congenital abnormalities, and in these circumstances it is outside the scope of this guideline to address these problems.

The NICE 2007 Intrapartum Clinical Practice Guideline does not specifically deal with polyhdramnios and its effect on labour and birth.

Where polyhdramnios exists, caution should be exercised during labour around the time of membrane rupture. When the membranes rupture, either spontaneously or artificially, if the presenting part is not well down into the pelvis, there is a risk of cord prolapse or fetal malpresentation.

Both maternal examination and fetal wellbeing should be checked at the time of membrane rupture. A “controlled artificial rupture” of membranes has been described and should only be performed when absolutely necessary, by an experienced clinician.[53]

Question 8. Does performing an amniotomy affect neonatal outcomes?
Amniotomy or artificial rupture of the membranes (ARM) is commonly used when there is concern about fetal wellbeing and the colour and volume of the liquor will provide further information. Historically, where amniotomy has been used routinely or to augment a labour that has become slow to progress, this practice has been discussed in another section. *[See Question 3, ‘What is delay in the first stage of labour and how is it managed?’]*

3centres Collaboration recommendations

- There are no standardised methods of detecting or grading the degree of meconium stained liquor. Thick meconium is more likely to be associated with oligohydramnios and more likely to be associated with an adverse outcome.
- As consequences of MSL are unpredictable and can be severe, continuous electronic fetal surveillance is recommended, as per the RANZCOG Intrapartum Fetal Surveillance Clinical Guideline.
- Amnioinfusion is not recommended.
- A clinician trained in neonatal resuscitation needs to be present at the birth of a neonate exposed to MSL.
- Suction of the mouth and pharynx is used only in non vigorous neonates.
- Amniotomy should be performed if there is concern for fetal well-being.

Future research recommendations

Development of a universal MSL detection and grading system that has compared neonatal outcomes.
Shortening the duration of labours complicated with MSL.

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Positions and mobilisation during the first stage of labour

Clinical questions:

1. What is the comparative effectiveness of mobilisation and position changes during labour in improving labour outcomes?

Question 1. What is the comparative effectiveness of mobilisation and position changes during labour in improving labour outcomes?

In the 2007 NICE antenatal care guidelines, the authors state there are no trials examining the effect of freedom of movement throughout labour compared with restriction of movement on outcomes such as comfort, labour progress and fetal wellbeing. There is a lack of high-level evidence to suggest that either mobilisation or any particular position in the first stage of labour affects outcomes.

NICE 2007 state that women should be encouraged and helped to move and adopt whatever positions they find most comfortable throughout labour.[27]

The results from the Cochrane review in 2008, using 21 studies involving 3706 women, considered various criteria broadly categorised as being either upright or recumbent.
The positions considered recumbent were: semi recumbent, lateral, supine.
The positions considered upright included: sitting, standing, walking, kneeling, squatting, and all fours (hands and knees).

Primary outcomes measured were: length of the first stage of labour, the type of birth/delivery and maternal satisfaction with the childbirth experience.
The primary fetal and neonatal outcomes were fetal distress during labour that necessitated immediate delivery and the use of mechanical ventilation for the neonate. There were numerous secondary outcomes measured.

The review authors concluded there is evidence that walking and upright positions in the first stage of labour reduce the length of labour by approximately one hour and do not seem to be associated with increased intervention or negative effects on mothers' and babies' wellbeing.
Women randomised to upright positions were also less likely to have epidural analgesia.

Women should be encouraged to take up whatever position they find most comfortable in the first stage of labour. There was little information collated regarding maternal satisfaction or on comparative evaluations of upright or recumbent positions.[54]

A literature review by Priddis et al. in 2011 reported on the impact of birth positions on maternal and perinatal wellbeing, and the factors that facilitate or inhibit women adopting various birth positions throughout the first and second stages of labour such as model of care, birth attendant and place of birth.

The authors identified 40 papers of varied evidence levels (4 systematic reviews, 2 randomised controlled trials conducted and published following the systematic reviews, 2 meta-analyses, 2 secondary analysis papers and 1 prospective cohort study, opinion papers and book chapters.)

The authors conclude that there is a lack of research into factors and/or practices within the current health system that facilitate or inhibit women to adopt various positions during labour and birth. Upright birth positioning appears to occur more often within certain models of care, and birth settings, compared to others. The preferences for positions, and the philosophies of health professionals, are also reported to impact upon the position that women adopt during birth.[55]

Summary. Question 1.
Women adopting an upright position and mobilising during the first stage of labour can shorten the duration of the first stage by approximately one hour.

The models of care, place of labour and individual health practitioners can all influence women's preferences for positioning, comfort, mobilisation and affect maternal levels of satisfaction.

3centres Collaboration recommendations

- Women should be encouraged to change position and adopt any position they find comfortable during the first stage of labour.
- Women should be free to mobilise during the first stage of labour.
- Aids such as birthing balls should be made available to facilitate position changes.

Future research recommendations

Comparative analysis of different positions and mobilisation to shorten the length of the first stage of labour.

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Non-pharmacological and complementary analgesia during the first stage of labour

Clinical questions:

1. What is the comparative effectiveness of non-pharmacological interventions or techniques in labour on labour and birth outcomes?

Question 1. What is the comparative effectiveness of non-pharmacological and complementary interventions or techniques in labour, on labour and birth outcomes?

The non-pharmacologic approach to pain relief includes a wide variety of methods that concentrate not only on the physical sensations of pain, but also attempt to reduce pain perceptions by enhancing the psycho-emotional and spiritual components of care. In this approach, pain is perceived as a normal accompaniment of most labours.

The woman is educated, ideally in the antenatal period, and assisted by her caregivers, and support people to take an active role in decision-making and in using self-comforting techniques and non-pharmacologic methods to relieve labour pain.

The 'working with pain' paradigm is based on the idea that pain is viewed as part of the physiology of normal labour. If sufficient support is provided, a woman can manage levels of pain in normal labour by using her own natural endorphins. Endorphins are natural opioids produced by the body in response to pain and other stressors. [56]

There is considerable support by midwives for the use of complementary and alternative therapies during labour, although educational and credentialing opportunities are said to be lacking.[57]

Many factors will influence a woman's experience and satisfaction with childbirth. Women's expectations of the duration and level of pain experienced, quality of her care-giver support, previous experience and expectations, and involvement in labour decision making are the most commonly reported factors[58]

The following, non-exhaustive selection of non-pharmacological and complementary labour analgesia methods in alphabetical order, are widely used and have been evaluated by systematic reviews or randomised controlled trials.

Non-pharmacological

Continuous support during labour

The value of psychological support during labour by a midwife that is in almost continuous attendance should not be underestimated. Research shows that one-to-one coaching and care by a midwife during labour, enables a woman to feel confident in her ability to cope and feel positive about her birthing experience. This perception can be long lasting and will also positively influence her disposition in any subsequent labours. [59]

A systematic review of twenty-one randomised controlled trials involving 15,061 women, demonstrated that women who received continuous support in labour were more likely to have a spontaneous vaginal birth, and that continuous labour support was associated with lower use of pharmacological analgesia, and fewer reports of maternal dissatisfaction. In addition, labours were shorter, regional analgesia rates were lower, instrumental birth and caesarean section rates were lower and babies were born with higher 5 minute Apgar scores.

The type of support included active listening, stroking, massage, words of encouragement, suggesting position changes, suggesting alternative methods of non-pharmacological analgesia, and merely being a presence in the room.[60]

Sterile water injection

This method of analgesia has gained in popularity by its proponents in the past decade. The premise behind its efficacy is gate control theory of pain, although it may also be that the sterile water injection leads to endorphin release similar to that found in acupuncture.[61]

Derry et al. in 2012 recently published a recent Cochrane systematic review to determine the efficacy of sterile water injections for relief of pain during labour compared to placebo or non-pharmacological interventions, and to identify any relevant effects on mode and timing of birth, or safety of both mother and baby.

The outcomes reported severely limited conclusions for clinical practice. There was little robust evidence that sterile water is effective for low back or any other labour pain. Nor was there any difference in birth or other maternal or fetal outcomes.

The authors concluded that large, methodologically rigorous studies are required to determine the efficacy of sterile water to relieve pain in labour.[62]

TENS

Transcutaneous electrical nerve stimulation (TENS) has been used to control the effects of labour pain for the past 15 to 20 years. It is a non-invasive, drug free form of analgesia favoured by those in labour who wish to minimise their use of pharmacological assistance.
It seems to be particularly effective if commenced early in labour.

The results of a Cochrane review by Dowswell et al. in 2011 concluded that there is weak evidence that TENS reduces pain in labour and it does not seem to have any impact (either positive or negative) on other outcomes for mothers or babies. However, many women said they would be willing to use TENS again in a future labour.

There are some limitations to the use of TENS machines in labour. It cannot be used in conjunction with water immersion and the potential electronic interference in the presence of a fetal scalp electrode during electronic fetal monitoring, precludes its use.

TENS is widely available in hospital settings and women should have the choice of using it in labour.[63]

Water immersion

The use of warm water to alleviate the pain of labour has long been thought to be a beneficial, non-pharmacological option.

Evidence from a Cochrane systematic review by Cluett et al., updated in 2011, which included 12 trials (3243 women): eight related to just the first stage of labour: one to early versus late immersion in the first stage of labour; two to the first and second stages; and another to the second stage only, suggests that water immersion during the first stage of labour reduces the woman's perception of pain and the use of epidural/spinal analgesia.

Although there is no evidence of increased adverse outcomes to the fetus, neonate, or woman as a result of the women's immersion in water during labour, the authors concluded that due to considerable heterogeneity within the studies, further research is required.[64]

The use of aromatherapy products in the water is not advised. Further, the quality of the water used in a bath/pool, the temperature and infection control polices should be stringently adhered to. [27]

Complementary therapies

Acupuncture and Acupressure

Acupuncture is defined as the insertion of fine needles into the skin at a combination of specific points in the body. It is believed to promote health and healing or relieve discomforting symptoms or pain.

Acupressure, or Shiatsu, an alternative to acupuncture, is pressure with fingers or small beads on acupuncture points. It is used for numerous ailments and discomforts in pregnancy, as well as for labour pain. Because the woman's partner or support person can carry out acupressure, some women may desire it during labour.

In 2011 Smith et al. conducted a Cochrane systematic review of the use of acupuncture and acupressure during labour. The review included 13 trials involving 1986 women and the authors concluded that acupuncture and acupressure might have a role with reducing pain,

increasing satisfaction with pain management and reduced use of pharmacological management. However, they identified a need for further research.[65]

Aromatherapy
Aromatherapy is the application of concentrated essential oils or essences distilled from plants, in order to use their therapeutic properties and has become a popular, non-pharmacological option for women during labour.

Essential oils are volatile, produce vapours, and must be used with caution as they have the potential for possible adverse effects on the woman and on others in the room.

A Cochrane systematic review in 2011 by Smith et al. included two trials (535 women). The trials found no difference between groups for the primary outcomes of pain intensity, assisted vaginal birth and caesarean section. There were more babies admitted to neonatal intensive care in the control group of one trial.

The authors concluded that there is a lack of studies evaluating the role of aromatherapy for pain management in labour. Further research is needed before recommendations can be made for clinical practice.[66]

Massage
Smith et al. in 2012 identified six trials involving 326 women in their Cochrane review.
The authors concluded that women who used massage felt less pain during labour when compared with women given usual care during first stage. However, they noted that trial sample sizes were low and more research is needed.[67]

Reflexology
Reflexology involves the application of the thumb and forefinger to apply deep pressure to specific areas of the feet that are claimed to correspond to internal organs, gland and other parts of the body. In their 2012 Cochrane review, Smith et al. found no eligible trials to assess the benefit of reflexology during labour.[67]

Music
Listening to music during labour as a distraction to the pain of contractions has anecdotally been of benefit to women.

The results of a Cochrane systematic review by Cepeda et al. in 2009 evaluating the effect of music on acute and chronic pain included two studies on the effect of music on pain in labour.

The authors concluded that listening to music during labour reduces pain intensity levels and opioid requirements, but the magnitude of these benefits is small and, therefore, its clinical importance unclear.[68]

Summary. Question 1.
Continuous midwifery support and care in labour reduces interventions and enhances maternal and fetal outcomes. This is supported by high-level evidence research.
Other forms of non-pharmacological pain relief have not been shown to cause harm and many women feel the various means available have some benefit.
Practitioners should be fully conversant with and credentialed to administer complementary therapies.

3centres Collaboration recommendations

- Continuous midwifery support in labour enhances the labour experience, reduces the

rates of intervention and its associated sequelae and should be available to every woman in labour.

- Local policies on credentialing of practitioners for the use of complementary medicine, acupuncture and sterile water injections should be available and current.

Future research recommendations

Research into the use of acupuncture and acupressure for pain relief during labour.
Further research into the benefits of water immersion for labour pain.
Large trials to assess the efficacy of sterile water injections for back pain in labour.
Research to assess the efficacy of essential oils to alleviate the pain of labour.

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Pharmacological analgesia during the first stage of labour

Clinical questions

1. What is the comparative effectiveness of pharmacological interventions or techniques used during the first stage of labour, on labour and birth outcomes?

1. What is the comparative effectiveness of pharmacological interventions or techniques used during labour on labour and birth outcomes?

As with non-pharmacological analgesia, ideally during her antenatal period, the woman has made informed choices regarding her preferences as to pain relief in labour, with a clear understanding of the risks and benefits of all options that are available to her.
Throughout Australia in 2009, 79% of women who went into spontaneous labour, received analgesia of some description.[2]

Inhalational

Since its inception in the early 1960's, the use of Nitrous Oxide for labour pain has remained a popular choice for women. Today it is marketed as Entonox.® (Usually 50% Oxygen and 50% Nitrous Oxide mix, but some delivery systems are able to be varied up to a 30%:70% ratio)

One systematic review was published by Rossen et al. in 2002 that included sixteen studies, eight of which were controlled trials, that examined the efficacy and safety of using Entonox.[69] In the NICE 2007 intrapartum care guideline, the authors were only able to source this one review.[27]

Entonox appears to be a safe and effective option, offering some degree of transient analgesic effects. It has a low side-effect profile but some women have reported light- headedness, nausea and vomiting. There is no evidence that fetal or neonatal outcomes are changed as a result of its use.

For safety, the woman should self-administer the Entonox via a mouthpiece, and she should be taught to start inhaling it from the beginning of a contraction, through to when the height of the contraction has passed. Entonox can be used safely throughout labour, including the second stage if appropriate. [70]

In a 2011 Cochrane systematic review of all labour analgesia reviews by Jones, Jones et al. concluded that inhaled analgesia conclusively demonstrated an analgesic effect when compared to a placebo, albeit with some side effects as previously mentioned.[71]

Intramuscular/ intravenous opioids
The use of intramuscular and intravenous opioids in Western maternity units for pain relief in labour has been widespread for many years.

The most popular option of these is pethidine, although some units may also offer diamorphine, fentanyl, remifentanil or tramadol.

In 2011 Ullman et al. conducted a Cochrane review that included 57 studies comparing the acceptability, effectiveness and safety of using different opioids, their route of administration and in varying doses. Opioids were compared with each other or with a placebo.
The authors concluded that there was significant heterogeneity between the trials included and overall, the methodological quality was poor and they advised caution when interpreting the results.

When compared with a placebo, opioids were found to be more effective at providing some pain relief, although there was insufficient data to recommend one drug in favour of another nor whether an intramuscular or intravenous route is preferable.

The side-effect profiles of each opioid were variable and included nausea, vomiting and drowsiness. This can be alleviated with the use of an appropriate anti-emetic given concurrently.

The effects of opioids on the neonate were variable and inconclusive although some studies reported higher rates of respiratory depression and use of naloxone.

Breastfeeding difficulties were also attributed to lethargic babies as a result of maternal opioid use. Effects of opioid use on maternal satisfaction were not reported. [72]

A recently published meta-analysis by Schnabel et al. in 2012 compared 12 randomised controlled trials comparing remifentanil patient-controlled analgesia (PCA) with other forms of labour analgesia including pethidine, fentanyl, nitrous oxide and epidural analgesia.

The authors found that remifentanil PCA was a superior analgesia for maternal satisfaction when compared to pethidine, but not as acceptable when compared to an epidural. There was no difference in the mode of birth or Apgar scores.

The side-effects of remifentanil are greater than those of pethidine and women required greater levels of monitoring for respiratory depression.[73]

Regional analgesia/anaesthesia
Epidural has become an increasingly popular method of pain relief for women in labour.
Some concern has been expressed relating to the timing of the placement of an epidural and the risk of a caesarean section.

Wassen et al. addressed this concern in a review in 2011. Six studies were included, involving a total of 15399 nulliparous women. An epidural received in the early latent phase (3cm or less) was compared with receiving an epidural in late active phase and the ensuing operative birth or caesarean section rate. The authors caution that this review is not applicable to women who are not in labour or who have an undilated and unfavourable cervix.

This systematic review showed no increased risk of caesarean birth or instrumental vaginal birth for women receiving early epidural analgesia at cervical dilatation of 3 cm or less in comparison with late epidural analgesia, and should allay any concerns for early epidural placement on the grounds of adverse outcomes.[74]

A Cochrane review was conducted by Anim-Somuah et al. in 2011, including 38 randomised controlled studies involving 9658 women, exploring epidural analgesia effects (including combined-spinal-epidural) on the mother and the baby, when compared with non-epidural or no pain relief during labour. All but five studies compared epidural analgesia with opiates.

The authors concluded that epidurals relieved labour pain better than other types of pain medication. There were however more instrumental births but caesarean birth rates did not differ overall. Fewer neonates required naloxone to counter opiate use by the mother for pain relief but the risk of caesarean section for fetal distress was increased.

Women who used epidurals were more likely to have a longer second stage of labour and not experience an expulsive urge to push, required oxytocin augmentation, experienced very low blood pressure, and experienced limited mobility for a period of time after the birth.

Motor blockage also caused urinary retention and more women experienced pyrexia. There was no difference in the incidence of long-term backache. The authors conclude that further research on reducing the adverse outcomes with epidurals would be helpful.[75]

A study by Riordan et al. highlighted the effect of labour pain relief medication on neonatal suckling and breastfeeding duration. The authors concluded that babies of mothers who had received an epidural for pain relief in labour often do not initially feed as effectively as those who had not received an epidural.[76]

Summary. Question 1.
Entonox® is easy to use and is self-administered. The analgesic effects are transient and no adverse fetal effects are recorded. The side-effects are nausea, vomiting and light-headedness.

Opioids are a popular choice of pain relief but the side-effects are nausea, vomiting, drowsiness and in extreme cases, respiratory depression. The effects on the neonate were variable and included a higher need for naloxone and breastfeeding difficulties.

Epidural or combined spinal/epidural does not affect caesarean section rates if placed early in labour. The risk of a longer second stage, oxytocin augmentation and an instrumental birth are greater. Side-effects are greater than compared to opioids, including low blood pressure, limited mobility following birth, pyrexia, and urinary retention.

Babies of mothers who had received an epidural, sometimes have greater difficulty establishing effective breastfeeding.

3centres Collaboration recommendations

- All forms of pharmacological analgesia have their benefits and side-effects. These should be discussed with the woman, preferably prior to or in early labour, in order for her to make an informed choice on her preferred option.
- If an epidural is opted for, ensure the woman is encouraged to void 3-4 hourly. Discuss and gain consent for urinary catheterisation, if she is unable to void.

Future research recommendations

The comparative effectiveness of all forms of pharmacological analgesia, their acceptability, side-effects, and maternal and neonatal risks.

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SECOND STAGE OF LABOUR

Search terms/key words used: Labour (labor), second stage, phase, active, passive, length, duration, delay, outcomes, observations, vital signs, transition, signs, involuntary, positions, perineum, perineal, trauma, tears, mutilation, massage, compress, hands poised, hands off or flexion of the head, episiotomy, nuchal cord, around neck, pushing, bearing down, spontaneous, expulsive, Valsalva, urge, breath holding.

Definition, duration & delay; maternal and fetal observations, Pushing; Maternal comfort measures; Trauma reduction; Nuchal cord.

Second stage of labour definition, duration and delay.

Clinical questions:

1. What maternal signs would signal transition into the second stage of labour?
2. How is the second stage of labour defined?
3. What is the average duration of the second stage of labour for nulliparous and for multiparous?
4. What is delay in the second stage of labour and how is it managed?

Question 1. What maternal signs would signal transition into the second stage of labour?

The woman may exhibit many signals that she has reached transition from the first stage and entered into the second passive or active stage of labour. Some of these may include facial expressions, agitation, words used, heavy breathing, a sense of not being able to contend with the contractions any more, feeling out of control, vocalising loudly, involuntary shaking, nausea or vomiting, a blood stained show, an occasional slight urge to push, rectal pressure.[77]

These signs are likely to be modified if the woman has an epidural. [*See Pharmacological analgesia in labour – epidural*.]

Question 2. How is the second stage of labour defined?

Various definitions for the second stage of labour have been used in practice over the years. Historically, the second stage has been described by many authorities as when full dilatation of the cervix has occurred until birth of the baby.

This description has latterly given way to the understanding that the second stage involves two phases, the passive phase where full dilatation has occurred but without expulsive urges, then the active phase where involuntary pushing occurs. This allows a less hurried approach to birth and conserves fetal reserves. Thus, having a completely dilated cervix is now considered an insufficient reason alone to commence active pushing.

In the NICE 2007 intrapartum care guideline, the authors define the second stage of labour as:
Passive second stage of labour:

- The finding of full dilatation of the cervix prior to or in the absence of involuntary expulsive contractions.

Onset of the active second stage of labour may include any or all of the following:

- The baby is visible.
- Expulsive contractions with a finding of full dilatation of the cervix or other signs of full dilatation of the cervix.
- Active maternal effort following confirmation of full dilatation of the cervix in the absence of expulsive contractions.[27]

Question 3. What is the average duration of the second stage of labour for nulliparous and multiparous women?

Janni et al. in 2002 reported that the duration of the second stage exceeded 4 hours in 4% of

1457 women, and that second stage duration bore no relationship to neonatal outcome. The authors concluded that there were little grounds for intervention while maternal and fetal conditions remained well, and there was progress in labour with descent of the presenting part. However, their group did observe that the rate of third-degree perineal lacerations increased as the second stage lengthened.[78]

Similarly a study by Rouse et al. in 2009 conducted solely on nulliparous women described that the rate of spontaneous birth in a cohort of 5341 women was 85% when the duration was <1 hour and 9% when it was >5 hours. The authors concluded that extending the duration of the second stage of labor would allow some women to achieve vaginal birth successfully, even those few women in whom the second stage has lasted 5 hours. They cautioned that those women in the latter group suffered higher rates of perineal trauma, infection, and uterine atony.[79]

Goldberg in 2007 states that it could be argued that pelvic floor disorders are "inevitable" consequences of childbirth, but he goes on to say that these disorders are often preventable. Strategies for improving pelvic health, and avoiding injury, exist for before, during, and after childbirth. Examples include pelvic floor conditioning, avoidance of routine episiotomy and operative vaginal birth, avoidance of prolonged second stage labor, and attention to pelvic floor rehabilitation during the postpartum period. [80]

Question 4. What is delay in the second stage of labour, and how is it managed?

Delay can be defined as: exceeding defined time parameters, lack of fetal decent and rotation, inefficient uterine activity, or ineffective pushing in the active phase of the second stage of labour.

A large cohort study of 121,517 women published in 2009 by Allen et al., demonstrated there was an increase in the risk of maternal obstetric trauma, postpartum hemorrhage, puerperal febrile morbidity, low 5-minute Apgar score, admissions to the neonatal intensive care unit, and perinatal morbidity among both nulliparous and multiparous women, with increasing duration of the second stage of labor, particularly for a duration longer than 3 hours in nulliparous and longer than 2 hours in multiparous women. The passive and active phases of the second stage of labour were not defined.[81]

Another cohort study involving over 5000 women conducted solely on multiparous women by Cheng et al. in 2007, described increased risk and adverse outcomes when the second stage of labour was extended beyond 3 hours.[82]

In their 2007 intrapartum care guideline, the NICE guideline development group was unable to source any evidence to underpin recommendations for management of delay in the second stage of labour.

The NICE guideline development group suggest that management of delay is conducted with sensitive support and encouragement. Clear contemporaneous documentation, which should describe timeframes, progress, plans and any consultation with colleagues should be kept.[27]

After one hour of the active phase, an amniotomy could be offered if membranes are still intact, although Smyth et al. in 2009 concluded that this practice does not confer a benefit.[31]

For nulliparous women consideration should also be given to the use of oxytocin if contractions are inadequate, with the offer of regional analgesia.

After two hours of the active phase, an experienced obstetrician should be involved in the management plan and care. Birth would be expected to take place within three hours of the onset of the active phase.

In multiparous women, birth is expected to take place after two hours of the active phase. After one hour, referral should be made to an obstetrician who is able to undertake an assisted vaginal birth and 15-30 minute reviews should be conducted. Oxytocin should not be started.[27]

In 2011 Le Ray et al. described both passive and active durations of the second stage of labour. The authors concluded that the risk of postpartum haemorrhage became statistically significant after 40 minutes of the active second stage and that risk rose as the duration extended.[83]

Summary Questions 1-4.

There are two phases to the second stage of labour – passive when full cervical dilatation is reached and active when both full dilatation is reached and involuntary expulsive urges exist.

While maternal and fetal conditions remain satisfactory and there is clear progress in labour, intervention is not required. Some or all of the following ascertains progress: Fetal descent and rotation, strength and length of contractions, effective pushing, a bloody show, anal pouting, movement of bowels.

Limited high-level evidence is available on which to recommend clearly defined parameters for the duration of the second stage of labour in both nulliparous and multiparous women. There is evidence to suggest that as the second stage duration lengthens, so does the risk of perineal trauma, uterine atony, postpartum haemorrhage and increased neonatal admissions to special care nurseries.

During the second stage of labour, the clinician must keep clear documentation, which should describe timeframes, progress, plans and any consultation with colleagues.

NICE have made recommendations in the absence of research, defining second stage labour delay and management interventions.

3centres Collaboration recommendations

- Passive second stage of labour is full cervical dilatation without expulsive urges. Active second stage of labour is full cervical dilatation with expulsive urges and/or visible presenting part.
- Accoucheurs should be alert to the numerous signs of transition to the second stage.
- Duration of the **combined** passive and active second stage should be within 3 hours in nulliparous women and 2 hours in multiparous women.
- Assessment of the whole clinical picture must be taken into account if these parameters are to be exceeded.
- Grounds for intervention prior to the reached parameters are based on maternal and fetal well-being and a full clinical appreciation of events to that point in time.
- Despite equivocal evidence, amniotomy may be considered in cases of delayed progress.
- The assessing obstetrician should also be able to conduct an assisted vaginal birth.

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Maternal and fetal observations during the second stage of labour

Clinical questions:

1. What are the routine maternal observations and their frequency during the second stage of labour?
2. What fetal surveillance should be performed in the second stage of labour?

Question 1. What are the routine maternal observations and their frequency during the second stage of labour?

The NICE 2007 Intrapartum Care Guidelines did not find research related specifically to the observations required in the second stage. Although not explicitly stated, the recommendations made are likely to be good practice points and should be recorded on the partogram as follows:

- Hourly blood pressure and pulse.
- 4 hourly temperature.
- Half-hourly documentation of the frequency of contractions.
- Frequency of the woman emptying her bladder.

Other recommendations made related to frequency of vaginal examinations and assessment of progress, which have been addressed in other sections of this guideline. [27]

Since the completion of the NICE 2007 Intrapartum Care Clinical Practice Guidelines, there has not been any further high-level evidence to help guide practice regarding maternal observations in the second stage of labour.

Question 2. What fetal surveillance should be performed in the second stage of labour?

Ongoing assessment of fetal wellbeing in the second stage should be performed according to the RANZCOG Intrapartum Fetal Surveillance Clinical Guidelines.[32]

3centres Collaboration recommendations

- The frequency of maternal observations needs to reflect local resources and be influential on the care given to a woman, if an abnormality was found. Maternal pulse can be taken every half hour, with blood pressure every hour, continue to take the temperature every four hours.
- The frequency of maternal observations needs to be reassessed if an abnormality is found.
- Fetal wellbeing should be assessed according to the RANZCOG Intrapartum Fetal Surveillance Clinical Guidelines

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Pushing in the second stage of labour

Clinical questions:

1. What are the comparative benefits of breath holding with coached pushing (Valsalva) and spontaneous pushing?

Question 1. What are the comparative benefits of breath holding with coached pushing (Valsalva) & spontaneous pushing?

Contrary to common practice around the world, there is no evidence to suggest that women need to be taught when and how to push during the expulsive, active second stage of labour.

Practice has evolved to encourage sustained breath holding with coached pushing (Valsalva manoeuvre) in the belief that it will expedite the birth.

A randomised trial in 2006 by Bloom et al., demonstrated that the duration of the second stage of labour was significantly shorter in the 'coached' pushing group compared to the 'spontaneous' pushing group with 46 minutes versus 59 minutes.[84]

Further, in a recent systematic review of randomised controlled trials, a reduction in almost 19 minutes in the duration of the second stage was noted in the coached pushing groups, there were however no differences in the rate of instrumental births.[85]

There are many published papers supporting the premise that the technique of sustained breath holding and forced bearing down during a contraction has detrimental effects to both the woman and her fetus, such as weakening the pelvic floor structures and reduced maternal oxygenation resulting in altered fetal acid base.[86-88]

In their systematic review in 2011, Prins et al. demonstrated that maternal urodynamic factors measured at 3 months postpartum were negatively affected by Valsalva pushing. Measures of first urge to void and bladder capacity were also decreased.[85]

In the NICE 2007 Intrapartum Care Guidelines the authors recommend that women should be informed that in the second stage they should be guided by their own urge to push. If pushing is ineffective or if requested by the woman, strategies to assist birth can be used, such as support, change of position, emptying of the bladder and encouragement.[27]

In 2009 Verheijen et al. conducted a Cochrane systematic review of the utility and safety of fundal pressure during the second stage of labour. The authors concluded that no benefit was bestowed by employing such techniques.

Fundal pressure has also been applied using an inflatable belt during the second stage of labour in women with an epidural. However this device does not appear to increase the rate of spontaneous vaginal births in women with epidural analgesia. [89]

Summary. Question 1.
There is a good deal of heterogeneity within the studies comparing Valsalva technique pushing with spontaneous pushing in the second stage of labour, some with questionable methodology.

Valsalva technique pushing may shorten the duration of the second stage of labour but has no impact on neonatal outcomes.

There is no evidence to suggest that the Valsalva technique with directed pushing in the second stage of labour benefits the woman. However, there is evidence that pushing in this manner can have a detrimental effect on both the woman and her fetus.

If the woman requests assistance or her pushing is ineffective she should be offered encouragement to change position, praised for her efforts, encouraged to push effectively and to empty her bladder if possible.

Poor progress in the second stage should be investigated by assessing the length and strength of the contractions, position and descent of the presenting part, the presence of a full bladder from both abdominal palpation and vaginal examination, and confirm full dilation.

Some practitioners have employed fundal pressure during the second stage of labour. It has not shown to be of benefit and the safety of such practice is not established.

3centres Collaboration recommendations

- Women should be encouraged to push according to their own expulsive urges.
- There is no place for sustained breath holding with coached pushing (Valsalva), particularly in the active second stage.
- If assistance is sought or pushing is ineffective, position changes and encouraged pushing may assist.
- Poor progress in the second stage should be investigated by assessing the efficiency of the contractions, abdominal palpation to check for full bladder, position and descent of the presenting part and vaginal examination to confirm full dilatation.
- Fundal pressure during the second stage of labour is not recommended.

Future research recommendations

RCT for Valsalva technique pushing-vs-spontaneous pushing in the second stage of labour.

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Maternal comfort in the second stage of labour

Clinical question:

1. What maternal comfort measures should be employed or encouraged during the second stage of labour?

Question 1. What maternal comfort measures should be employed or encouraged during the second stage of labour?

Positions

In the NICE 2007 intrapartum care guideline, the authors suggest that maintaining a supine position in the second stage of labour reduces the prospect of a spontaneous birth and increases the incidence of abnormal fetal heart rate patterns. Women therefore should be encouraged to combine spontaneous pushing with upright or hand and knees postures.[27]

A Cochrane systematic review by Gupta et al. in 2009 compared the risks and benefits of different positions adopted during the second stage of labour. The authors concluded that with the possible exception of increased blood loss greater than 500mL, and an increase in second degree tears when a squatting position is adopted, there were no other deleterious effects on either the woman or her fetus and that women should be allowed to make informed choices about the birth positions in which they might wish to assume for birth of their babies.[90]

Perineal massage

In the NICE 2007 intrapartum care guideline, intrapartum perineal massage is not recommended for the second stage of labour. [27] This recommendation is based on one trial by Stamp et al. in 2001, who concluded that the practice of perineal massage in labour does not increase the likelihood of an intact perineum or reduce the risk of pain, dyspareunia, or urinary and faecal problems. [91]

Warm perineal compress

The NICE 2007 intrapartum guideline cites one large observational study of borderline significance that supports the use of a warm perineal compress during the second stage of labour as being protective against perineal tears. However, NICE do not make a recommendation on this topic. [27, 92]

In 2011 Aasheim et al. conducted a Cochrane review on the use of perineal techniques to reduce perineal trauma during the second stage of labour. One of the techniques reviewed

was a warm compress to the perineum and the authors concluded that there was sufficient evidence to support the practice in a bid to reduce perineal trauma.[93]

Summary. Question 1.
There are several theoretical physiological advantages for adopting an upright position in the second stage of labour including gravity, less aortocaval compression, and improved acid-base balance for the neonate. Squatting positions have been associated with an increase in second degree perineal tears.

The evidence to support the technique of perineal massage during the second stage of labour is sparse. The practice is not recommended by NICE in their 2007 intrapartum care guidelines.

Warm compresses to the perineum during the second stage of labour may be efficacious in reducing the episiotomy and perineal tear rate and cause no harm. Evidence is minimal.

3centres Collaboration recommendations

- During birth, women should be free to choose the position they feel is the most comfortable and they should be encouraged to adopt upright positions if possible.
- Perineal massage is not recommended.
- Warm perineal compresses may be beneficial and may be favoured by some women.

Future research recommendations

The use of warm compresses for comfort and perineal trauma reduction.
The practice of perineal massage during the second stage to reduce perineal trauma.

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Reduction of perineal trauma in the second stage of labour

Clinical question:

1. What measures should be employed to reduce the risk of perineal trauma?

Question 1. What measures should be employed to reduce the risk of perineal trauma?

Hands on/hands poised for birth?
A large randomised controlled trial in the U.K., in 1998 entitled the HOOP trial, for "*hands on or poised*"), involved some 5,471 women who were randomised to either "hands on" (one hand flexing the baby's head and the other hand guarding the perineum) or "hands poised" (both hands off, but ready to apply light pressure to the advancing head in the case of rapid expulsion) at birth of the baby.

The results demonstrated that women in the "hands on" group reported slightly less perineal pain at the 10th postpartum day (31% vs. 34% of women in "hands poised"). At 3 months postpartum, no differences were observed in perineal pain or other functional outcomes (sexual, bowel, or urinary function or risk of depression).[94]

In the Aasheim Cochrane review of 2011, when examining the outcomes of “hands poised” or “hands off” techniques, the authors conclude that the studies have considerable clinical heterogeneity.
The terms “hands on,” “hands off,” “standard care” and “perineal support” meant different things across the studies and were not always defined sufficiently. In the “HOOP” trial, McCandlish 1998, “hands off ” trial not only meant no hand on the perineum and infant’s head until the head was born but, also no manual assistance for the birth of the shoulders.

Aasheim concludes that due to insufficient data and extreme heterogeneity between the studies, outcomes cannot be adequately assessed.[93]

Episiotomy

Episiotomy incidences around the world vary widely from 100% routine episiotomies in Taiwan to 9% selective episiotomies in Sweden. In the Western world, the incidence ranges from 62.5% in the USA to 30% across Europe[95]

In the 2007 NICE intrapartum care guideline, the recommendations are informed by one systematic review containing seven RCT's and eight cohort studies, which involved 5001 women. Most of the studies considered routine compared to restrictive episiotomy, medio-lateral compared to midline episiotomy and maternal outcomes such as pain, urinary incontinence, dyspareunia, and Apgar scores.

The NICE guideline authors recommend the following:

- A routine episiotomy should not be carried out during spontaneous vaginal birth.
- If an episiotomy is performed, the recommended technique is a medio-lateral episiotomy originating at the vaginal forchette and usually directed to the right side the angle to the vertical axis should be between 45 and 60 degrees at the time of the episiotomy.
- An episiotomy should be performed if there is a clinical need such as instrumental birth or suspected fetal compromise.
- Tested effective analgesia should be provided prior to carrying out an episiotomy, except in an emergency due to acute fetal compromise.

In addition, the authors also recommend that episiotomy should not be offered routinely at vaginal birth following previous third or fourth degree trauma and also women with infibulated genital mutilation should be informed of the risks of delay in the second stage and spontaneous laceration, together with the need for an anterior episiotomy and the possible need for deinfibulation in labour.[27]

In 2012, Carroli et al. published a Cochrane review, which assessed the effects of restrictive use of episiotomy compared with routine episiotomy during vaginal birth. Eight studies met the inclusion criteria involving 5,541 women.

The authors concluded that restrictive episiotomy policies have a number of benefits compared to policies based on routine episiotomy. There were less posterior perineal trauma cases, less suturing and fewer healing complications. They found no difference in pain, urinary incontinence, or dyspareunia. There was however, an increased risk of anterior perineal trauma with restrictive episiotomy.[95]

Summary. Question 1.

The evidence remains equivocal regarding the benefits of using a "hands on" or "hands poised" technique during the second stage of labour.

Many other contributory factors can influence the degree of perineal trauma including the woman's nutritional state, squatting position, perineal tissue integrity, coaching, expulsive efforts and speed of birth.

The routine use of episiotomy has given way in latter years to more restrictive polices, using a medio-lateral incision, governed by reasons for expediting the birth due to suspected fetal compromise.

The routine use of episiotomy for previous third or fourth degree perineal tear and for genital mutilation has given way to a more pragmatic approach, taking into consideration the woman's informed choice and historical factors.

3centres Collaboration recommendations

- Accoucheurs should decide on the most appropriate hand position that ensures a controlled and safe spontaneous birth.
- Restrictive episiotomy for fetal compromise using a medio-lateral incision.

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Nuchal cord at birth (Cord around the fetal neck)

Clinical question:
Question 1. What is the appropriate management for a nuchal cord?

Question 1. What is the appropriate management for a nuchal cord?

The incidence of a single or multiple loop nuchal cord varies widely in the literature from 10% to 37% with numerous studies citing ranges in-between these two extremes.[96]

The significance of a nuchal cord and associated maternal and fetal outcomes is difficult to determine from the dearth of existing literature and the heterogeneity between the studies. Despite being uncomfortable for the woman, risking perineal trauma and without scientific evidence to support it, historically midwives have routinely checked for and 'managed' nuchal cords.

A systematic review of the evidence regarding the management of nuchal cord by Melvin and Downe in 2007 included only one eligible trial and two surveys, in which the authors conclude that practices vary widely on the management of a nuchal cord, based upon training and experience and no definitive agreement exists on the ideal management of a nuchal cord.[97]

One study by Mercer et al. in 2005 provided a strong physiologic basis for not clamping and cutting the nuchal cord, stating that the literature has clearly shown an association between clamping the nuchal cord before birth and cerebral palsy, especially if it has been in conjunction with a shoulder dystocia.[98]

The authors describe the somersault manoeuvre as originally espoused by Schorn and Blanco in 1991. It involves 1) slow birth of the shoulders without manipulation of the cord, 2) flexing the neonate's head toward the mother's thigh as the shoulders are delivered, 3) keeping the infant's head close to the perineum and letting the body "somersault" out with feet pointing toward the mother's feet, and 4) unwrapping the cord and proceeding with normal management. [99]

The evidence for checking for and "managing" a nuchal cord is lacking however the routine practice of clamping and cutting the nuchal cord prior to birth of the anterior shoulder is to be discouraged.

3centres Collaboration recommendations

- Routine checking for nuchal cord confers no benefit.
- Routine clamping and cutting of a nuchal cord is discouraged.

Future research recommendations

The benefits of “hands on” or “hands poised” methods to facilitate birth.
Nuchal cord management.

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THIRD STAGE OF LABOUR

Search terms/key words used: Labour (labor), third stage, phase, definition, length, duration, delay, active, physiological, management, uterotonic, oxytocin, ergo*, umbilical cord, drainage, injection, placenta, retained, Umbilical, cord, clamping, delayed, immediate, early, draining, effect, term, preterm, cord blood, lactate, gas, placenta, retained.

General management; Umbilical cord clamping; Neonatal care; Retained placenta

General management

Clinical questions:

1. What is the definition and duration of the third stage of labour?
2. For active management of the third stage of labour, what is the optimal uterotonic agent, the timing, dose and route of administration?
3. What are the maternal benefits of routine umbilical cord drainage or injection for the third stage of labour?

Question 1. What is the definition and duration of the third stage of labour?

The definition of the third stage of labour is from the birth of the baby until expulsion of the placenta and membranes and control of bleeding.[100]

The duration of the third stage of labour is largely dependent upon whether a physiological or active management process is adopted. However, in hospitals worldwide and in accordance with the joint statement from the International Confederation of Midwives and the International Federation of Gynecology and Obstetrics, active management of the third stage of labour should be offered to all women.[101]

This involves the use of a uterotonic agent, clamping and cutting of the umbilical cord within 2-3 minutes of birth, controlled cord traction while ‘guarding the uterus’, uterine massage after the expulsion of the placenta. The third stage of labour would normally be completed within 30 minutes from birth.

Summary. Question 1.

Active management of the third stage of labour is recommended practice worldwide, with an anticipated completion period of 30 minutes.

Question 2. For active management of the third stage of labour, what is the optimal uterotonic agent, the timing, dose and route of administration?

Optimal agent

The routine use of a uterotonic agent to reduce post partum haemorrhage (PPH) has been an established practice for many years.

A Cochrane review by Cotter et al. in 2001 and updated in 2010, in which fourteen trials were included, examined the use of oxytocin compared to no uterotonics, oxytocin compared to ergot alkaloids, and a mix of oxytocin with ergometrine compared to ergometrine alone.

The authors concluded that there seems little evidence in favour of ergot alkaloids alone compared to either oxytocin alone, or to ergometrine-oxytocin (albeit with greater side-

effects), but the data are sparse. The authors caution that there is insufficient evidence to weigh up any side effects against the benefits.[102]

The optimal agent to use was the subject of another Cochrane review by McDonald et al. in 2009, where the effects of ergometrine-oxytocin with oxytocin alone in reducing the risk of PPH (blood loss of at least 500 mL) and other maternal and neonatal outcomes were compared.

The authors found a small, but statistically significant reduction in the risk of PPH of 500mL – 1000mL when using ergometrine-oxytocin. However, there was a large difference in the rates of side effects when compared with using oxytocin alone. [103]

More recently, in a large published randomised controlled trial involving 12,227 pregnant women designed to assess the severity of postpartum blood loss, women were assigned to either simplified placental delivery involving gravity and maternal effort (simplified package) or controlled cord traction and cord clamping (full package). Women in both groups received oxytocin (10 IU) immediately after birth. The setting was predominately in low-income countries where access to skilled birth attendants is sometimes difficult to secure. The primary outcome was blood loss of 1000 mL or more up to one hour after birth or to two hours if the woman continued to bleed.

The authors found that the essential component of delivery management was the injection of oxytocin and it was not cord clamping and cord traction that reduced the rates of postpartum haemorrhage.[104]

Timing of administration

The manufacturer's data sheets recommend that Syntocinon® or Syntometrine® be given with the birth of the anterior shoulder or immediately following the birth of the baby. [105, 106]

The latent period for the occurrence of the uterine response is considerably shorter with Syntometrine® (about 2 ½ minutes) than with ergometrine given alone (about 7 minutes)

The uterotonic effect of Syntometrine® lasts for several hours, compared with ½ - 1 hour when oxytocin is given alone.

With regards to the timing of administration, evidence is sparse. A Cochrane review by Soltani et al. in 2010 examined the effect of the timing of the administration of prophylactic uterotonics (before compared to after placental delivery) on the outcomes related to the third stage of labour.

Three trials involving 1,671 women were included in the review. The authors concluded that routine administration of oxytocin with the anterior shoulder compared with use of oxytocin after delivery of the placenta did not have any influence on the amount of bleeding postpartum or on rates of retained placenta. However, the authors advised caution when interpreting these results, as there was a degree of heterogeneity between the studies.[107]

Dose

The optimal therapeutic dosing of oxytocin remains equivocal. A number of high to moderate evidence level studies have examined the efficacy of a reduced dose of intravenous oxytocin at caesarean section, with and without an accompanying infusion with oxytocin added.

The authors collectively found that starting from 1 IU of intravenous Syntocinon®, it is equally efficacious without the side-effects, when compared with administering 5 IU. However, those results cannot be directly translated into practice for low risk women following a normal

labour and vaginal birth.[31, 108-110]

In the absence of research to inform an optimal therapeutic dose of oxytocin, it is reasonable to administer 5-10 IU as per established practice and the manufacturers guidance.[105]

Syntometrine® is the usual drug of choice when opting for a combined oxytocin with ergometrine uterotonic agent. 1mL contains oxytocin 5 IU/mL and ergometrine maleate 0.5 mg/mL.

Route of administration
Syntometrine® is given as an intramuscular injection. The intravenous route is possible, but not recommended.

The optimal route of administration of oxytocin was the subject of a Cochrane review by Oladapo in 2012. The authors were unable to include any trials to show whether giving oxytocin intramuscularly or intravenously is better in terms of potential benefits, side effects, or risks to the woman or her baby. They recommend future trials that are large enough to detect a difference in outcomes for the two administration routes.[111]

However, the manufacturers of Syntocinon® caution that if the intravenous route is chosen, it should be administered very slowly to avoid the side-effect of transient flushing, hypotension and tachycardia if administered too rapidly.

Summary. Question 2.
Optimal agent: Oxytocin with ergometrine confers a slight benefit in reducing the risk of PPH 500-1000ml, when compared with oxytocin alone. Oxytocin has fewer side-effects when compared to combined oxytocin with ergometrine or ergometrine alone. Giving Oxytocin was the essential component for third stage management in reducing PPH rates of ≥1000ml, rather than clamping and cutting the umbilical cord and controlled cord traction.

Timing of administration: The manufactures of Syntocinon® and Syntometrine® recommend that either drug be administered with the birth of the anterior shoulder or immediately after the birth of the baby.

Dose and route: Syntometrine® 1mL (oxytocin 5 IU/mL and ergometrine maleate 0.5 mg/mL) given intramuscularly. Syntocinon® 5IU given by slow intravenous injection or 10IU by intramuscular injection.

There was insufficient evidence to recommend either an intramuscular or intravenous route for oxytocin. If given intravenously it is advised that it is administered as a slow bolus due to the potential side effects of tachycardia, flushing, and hypotension.

3. What are the benefits of routine maternal umbilical cord drainage or cord injection of uterotonic agents or saline for the third stage of labour?

Umbilical cord drainage
In recent years, it has been postulated that the practice of maternal placental cord drainage will reduce the bulk of the placenta and allow the uterus to contract and retract, thus shortening the completion time of the third stage of labour and enhance bleeding control.

A clinical practice guideline published by the Society of Obstetricians and Gynaecologists of Canada (SOGC) in 2009 state “Placental cord drainage cannot be recommended as a routine practice since the evidence for a reduction in the duration of the third stage of labour is limited to women who did not receive oxytocin as part of the management of the third stage. There is

no evidence that this intervention prevents PPH." Leduc et al. for the SOGC base this recommendation on a Cochrane review by Soltani et al. in 2005, which included two trials for evaluation.[112]

In a 2011 update of the Cochrane review by Soltani et al. from 2005, the authors included 3 studies that assessed the effects of placental cord drainage with and without the use of uterotonic agents in the management of the third stage of labour.

The authors concluded that there was a small difference in the length of the third stage (3 minutes) and amount of blood loss (77mL) in the cord drainage group. There was no difference in manual removal of placenta, blood transfusion or the risk of postpartum haemorrhage. The authors add that these were small trials with a medium risk of bias and caution should be exercised when interpreting the results or changing current clinical practice.[113]

Routine uterotonic or saline umbilical vein injection for the third stage of labour.
It has been proposed that injection into the umbilical cord of saline or oxytocin is used as routine management for the third stage of labour.

A Cochrane review by Mori et al. in 2,012 assessed the available evidence to compare the effects of saline injections into the umbilical cord with injections of uterotonic agents for routine management for third stage of labour.

The authors included nine studies involving 1,118 women. In the comparison of intra-umbilical injection of normal saline plus oxytocin with intra-umbilical injection of saline only, the authors found no difference in outcomes for the number of women that required blood transfusions, the incidence of manual removal of placenta, blood loss, or length of the third stage of labour.[114]

Summary. Question 3
The evidence for routine maternal placental cord drainage is equivocal.
The evidence does not support routine injection of oxytocics or saline into the umbilical cord for third stage management.

3centres Collaboration recommendations
Active management of the third stage of labour should be recommended to all women and comprises of the following: ▪ 10 IU Syntocinon® I.M. **or** 5 IU Syntocinon® by slow I.V. bolus **or** 1mL Syntometrine® I.M. Given with the anterior shoulder or up to 2 minutes following the birth of the baby.
▪ Controlled cord traction is accompanied by guarding of the uterus. Following delivery of the placenta, fundal massage is carried out and continued if the uterus is not firm, central or there are signs of on-going bleeding.
▪ Routine maternal cord drainage or umbilical cord injection of oxytocin or saline is not currently recommended.

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Umbilical cord clamping

Clinical questions

1. What are the comparative benefits for immediate or delayed cord clamping in term and preterm neonates?
2. What are the benefits of alternative positions for the neonate before cord clamping?

Question 1. What are the comparative benefits for immediate or delayed cord clamping in term and preterm neonates?

Delayed cord clamping in term infants

The practice for the timing of cord clamping varies, but in general 'early' cord clamping is usually carried out in the first minute after birth, whereas 'late' cord clamping usually involves clamping the umbilical cord greater than one minute after the birth or when cord pulsation has ceased.

In the NICE 2007 Intrapartum Care Guidelines, the authors exercise caution regarding advocating delayed cord clamping. They state, "*most of the evidence is from low income countries where anaemia in babies is more prevalent, and studies from high income countries are, with one exception, not randomised trials. The highly variable descriptions of the timing of cord clamping further confuse the issue. The impact on babies in high income countries where anaemia is less prevalent is not known*."[27]

In 2007 a systematic review by Hutton and Hassan, was conducted to assess the effects of delayed cord clamping on term neonates. 15 trials were included in their analysis and the authors concluded that delayed clamping of the umbilical cord in full-term neonates for a minimum of 2 minutes following birth is beneficial to the newborn, extending into infancy. Although there was an increase in polycythaemia among infants in whom cord clamping was delayed, this condition appeared to be benign.[115]

A later Cochrane review in 2009 by McDonald et al. of early versus late cord clamping to determine the effects on the placenta on neonatal outcomes was conducted. Eleven trials were identified for inclusion, involving 2989 women and their newborn babies.

The authors found that there was no significant difference in the rate of postpartum haemorrhage between the early clamping group and the group where clamping was delayed for two to three minutes.

In addition, late cord clamping was shown to be advantageous for the infant by improving iron status, and although delaying clamping increases the risk of jaundice requiring phototherapy in 5% of infants as opposed to 3% in the early clamping groups, there may be merit in the practice, particularly in infants where access to good nutrition is poor.[116]

Since the 2009 Cochrane review, in 2011 Andersson et al. went on to publish the results of their trial, in a high income setting, involving four hundred neonates, which investigated the effect of early versus late cord clamping on term infant iron status at four months of age. The investigators found that delayed cord clamping compared with early clamping, resulted in improved iron status and reduced prevalence of iron deficiency at 4 months of age, and reduced prevalence of neonatal anaemia, without demonstrable adverse effects.[117]

Delayed cord clamping in preterm infants

A trial by Mercer et al. in 2006 studied the effects of 72 neonates under 32 weeks gestation, who were randomised to immediate (5-10 seconds) or delayed (30-45 seconds) cord clamping groups. There were no significant differences in the primary outcome measures of bronchopulmonary dysplasia and necrotizing enterocolitis however, there were significant differences in the secondary outcomes measured, and the low birth weight infants in the delayed clamping group had fewer incidences of intraventricular haemorrhage and late onset sepsis.[118]

In 2010 Mercer et al. followed up their original cohort of 72 infants at seven months corrected age and 58 infants, 29 from both the delayed cord clamp and immediate cord clamp groups were assessed for developmental outcomes.
The authors reported that male infants in the delayed cord clamp group had better neurodevelopmental outcomes with higher motor scores than the immediate cord clamp group.[119]

Rabe et al. in a 2010 Cochrane review studied the effects of immediate versus delayed cord clamping in preterm infants (30 to 120 seconds). Seven trials were included involving 297 preterm infants and delayed cord clamping was in excess of two minutes.
In the delayed group, there were fewer incidences of anaemia, low blood pressure and intraventricular haemorrhage.
The authors conclude that by delaying cord clamping by 30 to 120 seconds in infants less than 37 weeks gestation, there is less need for blood transfusion in addition to the aforementioned benefits.[120]

Another trial in 2011 by Oh et al. assessed the effects of immediate versus delayed cord clamping (30 to 45 seconds) in 33 very preterm infants with gestational ages of 24 - 28 weeks.
Outcomes were venous haematocrit at 4 hours of age, neonatal morbidities, and the need for blood transfusion during the infants' stay in hospital. The authors found that there was a beneficial higher venous haematocrit at four hours of age, indicating an effective placental transfusion in the delayed cord-clamping group.[121]

Summary. Question 1.
By delaying clamping of the umbilical cord for approximately two minutes in healthy term infants, suggests that delayed cord clamping may be of benefit, with better iron stores in infants in the longer term. Accessibility of phototherapy should be taken into consideration.

Delayed cord clamping does not require delayed administration of oxytocin in the active management of the third stage of labour. (See Active management of the third stage. Q.2)

There is ample evidence that unless immediate resuscitation is required, the practice of delayed cord clamping in preterm infants is supported.

Question 2. What are the benefits of alternative positions for the neonate before cord clamping?
A Cochrane review by Palethorpe et al. in 2010 attempted to compare the effects of alternative positions for the baby between birth and cord clamping on outcome for the baby, outcome for the mother and on use of health service resources.

The authors concluded that there is no reliable research to show whether lifting or lowering the baby in the time between birth and cord clamping makes a difference to the health of the baby or the mother. [122]

Summary. Question 2.
There is insufficient evidence to suggest the practice of lifting or lowing the baby prior to cord clamping affects outcomes for mother or baby.

3centres Collaboration recommendations

- Cord clamping can be delayed for 2-3 minutes for fetal benefits in term and preterm infants, providing immediate resuscitation is not required.

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Neonatal care

Clinical question.

1. What are the indications for taking cord blood samples?

Question 1. What are the indications for taking umbilical cord blood samples?

Analysing umbilical cord blood immediately following birth provides objective information on the acid-base status of the neonate, particularly in situations where oxygen deficiency or acidaemia may be suspected.

In 2006 the American College of Obstetricians and Gynecologists (ACOG) issued an umbilical cord blood gas and acid-base analysis committee opinion, which was reaffirmed in 2010. The ACOG committee supported the use of cord blood gas analysis for the following situations: Caesarean section for fetal compromise, low 5 minute Apgar score, severe growth restriction, abnormal fetal heart rate tracing, maternal thyroid disease, intrapartum fever, multifetal gestations. [123]

Furthermore, in a recent study of a policy of universal cord blood gas and/or lactate analysis, the authors found a significant improvement in cases of severe asphyxia and neonatal unit admissions. The authors suggest that the immediate availability of objective measurements of newborn well-being may be partially responsible for these improvements.[124]

Summary Question.1

Umbilical cord blood analysis provides objective information on the acid-base status of the neonate and should be undertaken for all births, particularly so if fetal compromise is anticipated or suspected.

3centres Collaboration recommendations

- Fetal cord blood analysis should take place for all births where equipment allows.

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Retained placenta

Clinical question.

1. What are the benefits of umbilical vein injection of oxytocics, in cases of retained placenta?
2. What are the maternal benefits of umbilical cord drainage for third stage delay?

Question 1. What are the benefits of umbilical vein injection of oxytocics, in cases of retained placenta?

Even with effective, active management of the third stage of labour, in Western populations, a placenta will be retained for 30 minutes or more in 2.67% of all births.[125]

Manual removal of the placenta under spinal or general anesthesia is an invasive procedure and not without associated risks.

As an alternative solution to manual removal, In 2011 Nardin et al. conducted a Cochrane review to assess the use of umbilical vein injection of saline solution alone or with oxytocin in comparison either with expectant management or with an alternative solution or other uterotonic agent for retained placenta.

There were fifteen trials of variable quality included, which involved 1704 women. The authors found the evidence equivocal. In their pooled analysis of all trials, there was evidence that

oxytocin into the umbilical cord reduced the need for manual removal of the placenta. However, when only high quality randomised trials were analyzed, the use of oxytocin had little or no effect.

Summary. Question 1.
The evidence is equivocal for the practice of umbilical vein injection of oxytocics in cases of retained placenta.

Question 2. What are the maternal benefits of umbilical cord drainage for third stage delay?
See 'What are the maternal benefits of routine umbilical cord drainage or injection for the third stage of labour?' above.

3centres Collaboration recommendations

- In cases of retained placenta, maternal cord drainage or injection of an oxytocic agent or saline into the umbilical vein is not recommended until the evidence is more conclusive of a beneficial effect.

Future research recommendations
Optimal uterotonic agent, the route, dose and timing of administration.
The benefits of maternal umbilical cord drainage.
Umbilical vein injection for routine third stage management and for retained placenta.
Cord blood analysis for all births.
Alternative positions for the baby during delayed cord clamping.

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CARE OF THE WOMAN AND NEWBORN IMMEDIATELY FOLLOWING BIRTH

Search terms/key words used: Fourth stage labour (labor), immediate, maternal, observations, assessments, Apgar, newborn, feeding, skin-to-skin, vitamin K.

Maternal assessments and care, neonatal assessments and care.

Maternal assessments and care

Clinical questions

1. What maternal assessments and care should take place in the first hour following birth?
2. What neonatal assessments and care should take place in the first hour following birth?
3. What practices should be employed to promote maternal and neonatal bonding?

Question 1. What maternal assessments and care should take place in the first hour following birth?
Care and assessment of the woman immediately following birth includes both physical and psychological components. Reactions to childbirth can vary from euphoria to disengagement, with a variety of responses in-between. Physical states can also vary from boundless energy to shock or exhaustion.

There is very limited research to underpin the following basic care and observations, and recommendations from the 2007 NICE intrapartum guideline are predominately utilised in this section.[27]

Initial maternal assessment:

- Temperature, pulse, and blood pressure.
- Check the woman's uterus is firm, central, approximately at the level of the umbilicus,

and well contracted. Check blood loss.
- Examination of placenta and membranes – assessment of their condition, structure, cord vessels, and completeness
- Early assessment of maternal emotional/psychological condition in response to labour and birth.
- Assess the woman to ensure she has passed a reasonable volume of urine.
- Attention paid to the woman's personal hygiene needs.
- Women with rhesus negative blood should have blood taken for a Kleihauer test and antibody screen.
- Offer analgesia for 'after pains'.

Perineal care

To minimise blood loss and the risk of infection, prompt repair of an episiotomy or perineal lacerations are required.

Prior to assessment and perineal repair, the accoucheur must gain consent from the woman, ensure her optimal comfort and provide adequate analgesia. Good lighting is also imperative in order to visualise the genital area.

The accoucheur must be adequately trained, supervised or experienced in genital assessment and perineal repair techniques before undertaking this procedure.

The Royal College of Obstetricians and Gynaecologists description of perineal trauma has been adopted and is defined as follows:
- First degree – injury to skin only
- Second degree – injury to the perineal muscles but not the anal sphincter

Third degree – injury to the perineum involving the anal sphincter complex
- 3a – less than 50% of external anal sphincter thickness torn
- 3b – more than 50% of external anal sphincter thickness torn
- 3c – internal anal sphincter torn
- Fourth degree – injury to the perineum involving the anal sphincter complex (external and internal anal sphincter) and anal epithelium.[110]

Summary. Question 1.

Both physical and psychological care should be attended to.
Vital signs include: Temperature, pulse, and blood pressure.
The uterus should be well contracted and blood loss minimal.
Check completeness and structure of placenta and membranes.
Assess the woman to ensure she has passed urine and that her hygiene needs are met.
Bloods taken for Kleihauer and antibody screen if required.
Analgesia should be offered if required.

Neonatal assessments and care

Question 2. What neonatal assessments and care should take place in the first hour following birth?

Apgar

Apgar scoring was first introduced as a means of assessing the newborn in 1953 by Virginia Apgar, as a simple and reproducible means of assessing the newborn's need for additional care or resuscitation. This method has stood the test of time and remains the standard newborn assessment today[126]

Apgar scores should be conducted at one and five minutes by assessing tone, respirations, heart rate, colour, activity and assigned a score from 0-2 accordingly.

On-going checks within the first hour of extra-uterine life of the baby's colour and respirations should be conducted regularly and the mother educated to alert staff to any change in these.

A brief visual examination of the baby can be conducted to exclude any obvious physical anomaly or need for immediate referral. Additional neonatal assessments include a head-to-toe check, weighing, head circumference and temperature. However, these can be delayed until after the first hour of life.

Vitamin K

Parents should receive written information and be educated on the importance of vitamin K prophylaxis and the decision made in the antenatal period as to which is their preferred route of administration. [127]

Vitamin K may be given in the first hour following birth or delayed until after transfer to the postnatal ward, or given prior to discharge, if that is within a few hours of birth.

Documentation

Contemporaneous documentation should include the date and time of birth, any resuscitative measures undertaken or need for additional care, completion of the birth register and any other documentation practices as per unit policy.

The baby should have two identification bands completed, checked with the mother and placed securely on the baby.

Summary. Question 2.

Complete Apgars at 1 and 5 minutes.
Conduct a brief visual inspection of the baby.
Vitamin K may be given in the first hour or delayed for 3-4 hours.
Ensure contemporaneous documentation.

Maternal and neonatal bonding

Question 3. What practices should be employed to promote maternal and neonatal bonding?

Skin-to-skin

Immediately following the birth, if no resuscitation is required and providing it is in accordance with the woman's wishes, the baby should be placed skin to skin on the mother's chest, and covered with a warm towel or blanket around its head and back.

The attending health care professional must astutely and discreetly balance maternal and neonatal observations and care with an awareness for the need of the woman and her support persons to savour the first moments with their new baby.

Therefore, in order to avoid separation and promote maternal/baby bonding, providing mother and baby are well, any in-depth assessments can be delayed for an hour following the birth.

Feeding

The mother's choice on how to feed her baby must be supported. It is beyond the scope of this guideline to delve into great depth or detail on breastfeeding techniques or practices, suffice to say that there is evidence to suggest that the first feed should be encouraged within the first hour of birth with assistance if required. The benefits aside from nutritional, are enhanced relationship with mother and baby, and regulation of the baby's temperature.[128]

Summary. Question 3.

Ensure skin-to-skin contact occurs unless requested otherwise. Ensure that the baby has attempted to feed within the first hour of birth.

3centres Collaboration recommendations
▪ Observations of: Maternal temperature, pulse, blood pressure, uterine contractions, fundal height and vaginal loss.
▪ Awareness of the woman's emotional response to childbirth.
▪ Examination of the placenta, membranes and cord vessels.
▪ Attention to maternal hygiene and assess whether voiding has been successful.
▪ Maternal Rh-ve bloods for Kleihauer.
▪ Apgar scores completed at one and five minutes and a brief neonatal check for any obvious physical anomalies.
▪ Vitamin K administered by preferred route, following consent. (May be delayed)
▪ Documentation should be contemporaneous and reflect local policies.
▪ Skin-to-skin immediately following birth, providing mother wishes this, and she and baby are well.
▪ Support choice of feeding method. Breastfeed in the first hour.

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