Abstract

Objective: The purpose of this guideline is to provide guidance for the intrapartum management of spontaneous labour, whether normal or abnormal, in term, healthy women, and to provide guidance in the management of first and second stage dystocia to increase the likelihood of a vaginal birth and optimize birth outcomes.

Evidence: Published literature was retrieved through searches of PubMed and the Cochrane Library in October 2011 using appropriate, controlled vocabulary (e.g., labour pain; labour, obstetric; dystocia) and key words (e.g., obstetric labor, perineal care, dysfunctional labor). When appropriate, results were restricted to systematic reviews, randomized control trials/controlled clinical trials, and observational studies. Results were limited to the last 10 years. Searches were updated on a regular basis and incorporated in the guideline up to June 15, 2015.

Values: The quality of evidence in this document was rated using the criteria described in the Report of the Canadian Task Force on Preventive Health Care (Table 1).

Summary Statements

1. The duration of the first stage of labour increases with maternal age and body mass index. (II-2)

2. In low-risk nulliparous women in the active phase of labour (i.e., equal to or greater than 4 cm dilatation), progress of cervical dilatation greater than or equal to 0.5 cm/hour is considered normal. (II-2)
Table 1. Key to evidence statements and grading of recommendations, using the ranking of the Canadian Task Force on Preventive Health Care

<table>
<thead>
<tr>
<th>Quality of evidence assessment*</th>
<th>Classification of recommendations†</th>
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<tbody>
<tr>
<td>I: Evidence obtained from at least one properly randomized controlled trial</td>
<td>A. There is good evidence to recommend the clinical preventive action</td>
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<tr>
<td>II-1: Evidence from well-designed controlled trials without randomization</td>
<td>B. There is fair evidence to recommend the clinical preventive action</td>
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<tr>
<td>II-2: Evidence from well-designed cohort (prospective or retrospective) or case–control studies, preferably from more than one centre or research group</td>
<td>C. The existing evidence is conflicting and does not allow to make a recommendation for or against use of the clinical preventive action; however, other factors may influence decision-making</td>
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<td>II-3: Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in the category</td>
<td>D. There is fair evidence to recommend against the clinical preventive action</td>
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<tr>
<td>III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees</td>
<td>E. There is good evidence to recommend against the clinical preventive action</td>
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*The quality of evidence reported in these guidelines has been adapted from The Evaluation of Evidence criteria described in the Canadian Task Force on Preventive Health Care.

†Recommendations included in these guidelines have been adapted from the Classification of Recommendations criteria described in the Canadian Task Force on Preventive Health Care.

3. Each labour unit should have a guideline for opioid use during labour that includes the method of action, average and maximum doses, route of administration, possible maternal and fetal side effects, precautions, and opioid antagonists and resuscitative measures for each drug. (III)

4. Epidural analgesia provides the most effective pain relief for women in labour. The timing of initiation of labour epidural is dependent on the woman’s choice once the diagnosis of labour has been established. (I)

Recommendations

1. Health care providers should delay term labour admission to the birthing unit until active labour (i.e., equal to or greater than 4 cm dilatation) is established. (II-2A)

2. Documentation and communication of labour progress are important aspects of labour management. Labour and delivery units should establish local policy regarding labour documentation, including partogram use and its application in labour management. (III-A)

3. Women should be informed of the benefits of upright positioning in labour and encouraged and assisted to assume whatever positions they find most comfortable. (I-B)

4. Women who are at low risk of requiring general anesthesia should have the choice to eat or drink as desired or tolerated in labour. (I-A)

5. Continuous labour support is recommended for all women in active labour. Each labour unit should aim to provide the opportunity for each woman to receive continuous 1-to-1 labour support. (I-A)

6. Amniotomy and oxytocin, in addition to other measures, should be considered once a diagnosis of dystocia has been made in either the first or second stage of labour. (I-B)

7. Women and health care providers should have information about coping strategies for early labour and mechanisms for accessing support from caregivers. (III-A)

8. When appropriate, health care providers should support women in their choice of analgesic options in labour. These may include pharmacological and non-pharmacological measures. (III-A)

9. Each woman should be provided with evidence-based information about labour analgesia options prior to the onset of labour and offered ample opportunity to discuss the risks and benefits of each option available at her planned site of delivery. (III-A)

10. The use of meperidine as labour analgesia should be avoided due to its long-acting active metabolites and negative effects on neonatal behaviours. (II-2B)

11. Low-dose epidural, when available, is preferred over high-dose epidural for labour analgesia and in promoting mobility in labour. (I-A)

12. Women who receive an epidural should be encouraged to maintain mobility and flexibility in positions of comfort throughout labour. (I-B)

13. Once an epidural has been established, the infusion should be continued until completion of the third stage of labour. (I-A)

14. Pushing, as a component of second stage progress, may commence when the cervix is fully dilated, the presenting part is considered engaged, and the woman feels an urge to push. (II-A)

15. Delayed pushing is preferred when the woman has no urge to push, particularly if the presenting part is above station +2 and/or in a non-occiput anterior position, assuming the fetus does not display abnormal monitoring and the pregnant woman’s status is satisfactory. (I-A)

ABBREVIATIONS

AMTSL active management of the third stage of labour
BMI body mass index
CCT controlled cord traction
CLS continuous labour support
CS Caesarean section
IUPC intrapartum pressure catheter
IV intravenous
OASIS obstetrical anal sphincter injuries
PCEA patient-controlled epidural analgesia
PPH postpartum hemorrhage
RCT randomized controlled trial
SOGC Society of Obstetricians and Gynaecologists of Canada
TENS transcutaneous electrical nerve stimulation
16. Delay of pushing according to parity and the presence or absence of an epidural should follow the time limits described in the text unless there are extenuating circumstances. (II-2B)

17. The method of pushing, spontaneous or directed with Valsalva manoeuvre, should be chosen using the woman’s own preference. Directed pushing may assist with the final expulsion of the head. (II-2B)

18. Avoid the use of routine episiotomy in spontaneous vaginal births. (I-A)

19. Prophylactic oxytocics should be given after the delivery of the baby. (I-A)

20. In term and preterm infants who do not require neonatal resuscitation, delayed umbilical cord clamping for 60 seconds is recommended irrespective of the mode of delivery. (I-B)

21. Dystocia should not be diagnosed prior to the onset of the active phase of the first stage of labour or before the cervix is at least 4 cm dilated. (II-2D)

22. Oxytocin augmentation should be titrated to avoid tachysystole or excessive uterine activity and to produce a uterine contraction pattern of 4 to 5 contractions in 10 minutes (200 Montevideo units). A minimum of 4 to 6 hours of adequate uterine activity may be required to achieve the desired response. (I-A) It is recommended that every obstetrical unit have an identified and accessible protocol that includes a starting dose, increment interval, and maximum dose. Consistent use of 1 standard approach to oxytocin administration in any 1 obstetrical unit should be considered. (III-A)

23. Operative delivery less than 2 hours after commencing pushing is not recommended, provided maternal status and fetal surveillance are normal. (III-D)

24. When the second stage exceeds the recommended time limits (see text), consideration should be given to expediting delivery. Extending these time limits may be appropriate in the presence of continued descent of the head, satisfactory maternal and fetal status, and imminent vaginal birth. (II-2B)

25. High-dose oxytocin regimens have been shown to decrease labour duration compared with low-dose regimens. The lowest dose needed to produce normal progress is recommended to reduce the risk of tachysystole or excessive uterine activity and to create a uterine contraction pattern of 3 to 5 contractions or 200 or more Montevideo units every 10 minutes. (I-A)
INTRODUCTION

Labour management supports the natural physiological process of birth while identifying potential concerns. The purpose of this guideline is to provide guidance for the intrapartum management of normal and abnormal labour, to increase the likelihood of a vaginal birth, and to optimize maternal and fetal outcomes. Promotion of normal birth involves a balance between non-intervention and the judicious use of technologies that support safe outcomes for both the mother and baby.

This guideline focuses on the management of spontaneous labour in healthy women at term, with a singleton vertex fetus with no maternal or fetal risk factors. In addition, the guideline discusses the management of dystocia in the first and second stages of labour in the same population.

Definitions of Labour

<table>
<thead>
<tr>
<th>Labour: first stage</th>
<th>Regular uterine contractions accompanied by cervical dilatation and/or effacement. The first stage of labour includes the latent and active phases.</th>
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<tbody>
<tr>
<td>Latent phase</td>
<td>Presence of uterine activity resulting in progressive effacement and dilatation of the cervix proceeding to active phase. It is complete when a nulliparous woman reaches 4 cm dilatation and a parous woman reaches 4 to 5 cm. Cervical length is generally less than 1 cm.</td>
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<tr>
<td>Active phase</td>
<td>Presence of a pattern of contractions leading to cervical effacement and dilatation at 4 cm or greater in a nulliparous woman or 4 to 5 cm dilatation in a parous woman.</td>
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<tr>
<td>Labour: second stage</td>
<td>Full dilatation to delivery of the baby.</td>
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<tr>
<td>Passive second stage</td>
<td>Full dilatation but without active pushing.</td>
</tr>
<tr>
<td>Active second stage</td>
<td>Full dilatation with active pushing.</td>
</tr>
<tr>
<td>Labour: third stage</td>
<td>Immediately after delivery of the baby to delivery of the placenta.</td>
</tr>
<tr>
<td>Labour: fourth stage</td>
<td>Immediately after delivery of the placenta to 1 hour postpartum.</td>
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<tr>
<td>Dystocia</td>
<td>Delayed or arrested progress in labour, irrespective of cause.</td>
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<tr>
<td>In active first stage</td>
<td>Greater than 4 hours of &lt; 0.5 cm/hour dilatation or no dilatation over 2 hours.</td>
</tr>
<tr>
<td>In active second stage</td>
<td>Greater than 1 hour of active pushing without descent of the presenting part.</td>
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<tr>
<td>Obstructed labour</td>
<td>No cervical dilatation or descent over 2 hours despite evidence of strong contractions (caput, molding, or measured using an IUPC).</td>
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</table>

Labour Time Frames

The mean duration and longest acceptable duration of labour and the “normal” rates of cervical dilatation were historically established by Friedman in the early 1950s. These were based on a mixed population of women who were in either spontaneous or induced labour and with fetuses in the vertex and breech presentations and were established before the introduction of epidural analgesia.

More recently, Zhang et al. studied 1162 nulliparous women with a single term fetus in the vertex presentation in spontaneous labour who delivered vaginally and demonstrated a markedly different curve than that of Friedman’s. Almost half of the women included in Zhang’s study received regional anesthesia and oxytocin augmentation. Although both labour curves depict a relatively slow rate of cervical dilatation during the latent phase, the transition from the latent to active phase is less obvious in Zhang’s labour curve (Figure 1). Cervical dilatation from 4 to 10 cm took 5.5 hours in Zhang’s curve instead of 2.5 hours in Friedman’s curve, and the rate of cervical change was noted to be more gradual. In Zhang’s curve, women in the lowest fifth percentile for rate of cervical dilatation experienced dilatation less than 1 cm/hour. Several studies, including data from a large retrospective cohort from the Consortium of Safe Labor, further confirmed the findings.
of these more contemporaneous labour patterns. The upper limit of normal active phase dilatation appears to be longer and the rate of cervical dilatation slower that those initially set by Friedman, ranging from 0.5 to 0.7 cm/hour for nulliparous women and from 0.5 to 1.3 cm/hour for parous women. Only half of nulliparous women in the active phase dilated at a rate greater than 1.2 cm/hour.

 Although authors from the Consortium of Safe Labor did not identify labour duration for the diagnosis of dystocia in the active phase, they suggested that the diagnosis should not be made before 6 cm of cervical dilatation. This, however, has yet to be evaluated.

Multiple factors can affect the length of labour for any given woman. Peisner and Rosen found that dilatation in 90% of women who experienced a successful vaginal birth progressed at greater than or equal to 1 cm/hour after 5 cm. They concluded that when a woman’s cervix is not rapidly dilating after reaching 5 cm, her labour is probably abnormal and should be closely evaluated.

From all of the aforementioned labour studies, it is evident that the duration of labour varies from woman to woman and the rate of cervical change is faster in the active phase of the first stage of labour and in parous women.

Physiological Factors Influencing Labour

Successful labour and vaginal delivery depend on the dynamic relationship between the fetus, the maternal pelvis, and uterine and maternal power. Dystocia can be related to the difficulty with any of the 4 Ps: power, passenger, passage, and psyche, which can influence the progress of labour and delivery.

Maternal factors

**Power** contractions

maternal expulsive efforts

During labour, palpation of uterine contractions is recommended to assess the uterine activity. Assessment of the strength of contractions by palpation and/or external tocodynamometry does have limitations. Manual palpation provides a subjective estimate of intensity and can be more difficult to assess when obesity is a factor. External tocodynamometry cannot accurately detect contraction strength. Using an IUPC is the only accurate method to assess the intensity of uterine contractions. An IUPC may be considered in situations in which accurate assessment of uterine contractions cannot be assessed with external tocodynamometry. When using an IUPC, contraction strength is considered to be adequate at 50 to 60 mmHg above baseline or > 200 Montevideo units (sum of uterine contraction pressure above baseline multiplied by the number of contractions in 10 minutes).

**Passage** pelvic bony structure

soft tissue factors (pelvic tumours, full bladder/rectum, vaginal septum, obesity)

Clinical examination of the passage may reveal prominent spines or sacrum, a narrow pubic arch, or a space-occupying mass in the pelvis (e.g., fibroids). Neither antenatal radiological nor clinical pelvimetry has been shown to predict the outcome of labour.

**Psyche** pain

anxiety

“Hormones released in response to stress can … bring about dystocia. Sources of stress vary for each woman, but pain and the absence of a support person are the two accepted factors. Confinement to bed and the restriction of maternal movement can also be a source of psychological stress. Maternal anxiety may inhibit normal cervical dilatation resulting in prolonged labour and increased pain perception. Maternal anxiety also causes an increase in the levels of stress-related hormones (β-endorphin, adrenocorticotropic hormone, cortisol, and epinephrine). These hormones, which act on the smooth muscle of the uterus, can lead to dystocia by reducing uterine contractions.”

Fetal factors

**Passenger** position

attitude

**Figure 1. Comparison of Friedman’s curve and Zhang’s contemporary labour curve.**
abnormalities (e.g., hydrocephalus)

The fetus should be assessed for size and position. Adequate uterine power in labour will often correct malposition, whereas inadequate power may result in persistent malposition. A normal-sized infant may present an increased diameter to the pelvis because the head is not flexed or is asynclitic. Adequate maternal/uterine power may overcome this problem. Use of the hands and knees position for 10 minutes twice daily was not found to correct an occiput posterior fetal position in late pregnancy.14

The diagnosis of true or absolute cephalopelvic disproportion should be limited to the uncommon instance of real disproportion (i.e., the inability of the well-flexed head [suboccipito bregmatic presentation] to pass through the bony pelvis despite clinical evidence of adequate uterine power [caput and molding or IUPC]). Malposition, on the other hand, may lead to relative disproportion. Accurate assessment and description guide management, and if a CS is performed for true cephalopelvic disproportion, it will help determine suitability for a future trial of labour after CS.

Other factors influencing labour

Prenatal education. Women and their partners seek prenatal education to help them understand the process of birth and the potential options related to labour, pain relief, and infant care. The effects of various forms of prenatal education on labour outcomes are largely non-conclusive and have not been fully evaluated to date.15

Maternal age. The average maternal age is rising. The proportion of women who are 35 years or over giving birth has increased steadily in the past decades.16 Older maternal age is associated with increased obstetrical and perinatal complications and increased obstetrical intervention, including labour induction, oxytocin augmentation, prolonged labour, instrumental delivery, and intrapartum Caesarean birth.16,17 The effect of delayed child-bearing among 583 843 nulliparous women in Scotland between 1980 and 2005 on primary Caesarean delivery rates was studied by Smith et al.18 For every 5-year increase in age, they noted an increase of 0.49 hours in duration of labour (95% CI 0.46 to 0.51). The authors also demonstrated a reduction in spontaneous myometrial contractile activity with increasing maternal age.

Obesity. A number of observational cohort studies have examined the relationship between maternal pre-pregnancy BMI and the duration of labour.19–25 Overall, the studies have found that the duration of the first stage of labour increases with a rising BMI. In a high-quality study of 5200 deliveries in which the second stage of labour was reached, Norman et al.24 found that obese (BMI ≥ 30) nulliparous and parous women took approximately 1 hour longer to dilate from 4 to 10 cm compared with women with a normal pre-pregnancy BMI (≤ 25). In a smaller, second study of 612 term deliveries to nulliparous women, Vahra-tian et al.19 found that dilatation from 4 to 10 cm was 105 minutes longer in obese (BMI > 29) women, adjusted for labour induction and augmentation. It is likely that the true difference in first stage labour duration between obese and non-obese women is larger than what was observed in these studies. Because obese women are more likely to undergo a first stage Caesarean delivery due to dystocia, women with the longest labour durations may have been excluded from the cohort.19–21,25

The median and 95th percentile values for the duration of the first stage of labour according to maternal BMI at the time of delivery admission from a large cohort of 119 000 deliveries may be useful in establishing normal and abnormal progress.26 Table 2 shows that labour proceeds more slowly as BMI increases, suggesting that labor management should be tailored to allow for these differences.

Overall, there is good evidence that the duration of the first stage of labour increases with a rise in maternal BMI. Biological/physiological studies27 that have examined hypothesized relationships in vitro between secretions from adipose tissue and characteristics of uterine contractility complement the epidemiological literature

<table>
<thead>
<tr>
<th>Table 2. Adjusted duration of labour (hours) by BMI (kg/m²) categories</th>
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<tbody>
<tr>
<td>Cervical dilatation 4 to 10 cm</td>
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<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Nulliparous</td>
</tr>
<tr>
<td>Parous</td>
</tr>
</tbody>
</table>

and further elucidate the causal mechanism underlying this relationship.20

Summary Statement

1. The duration of the first stage of labour increases with maternal age and body mass index. (II-2)

MANAGEMENT OF THE FIRST STAGE OF LABOUR

Labour is a normal physiological process. Most women who enter labour spontaneously would be expected to experience their labour and birth with minimal interventions.28 Any interventions to this process should be based on an identified real or potential problem. Use of unnecessary interventions (e.g., routine amniotomy) may lead to further interventions, including Caesarean birth.

Over the past few decades there has been a dramatic increase in the number of CS being performed.29 CS is associated with increased maternal morbidity and mortality, increased neonatal morbidity, and increased health care costs. Labour dystocia and elective repeat CS account for the majority of CS being performed. Optimal management with support of the normal labour processes and the appropriate management of labour dystocia, if it occurs, could potentially lead to a significant reduction in the primary CS rate and the number of women labouring in a subsequent pregnancy after a prior CS.

Latent Phase of the First Stage of Labour

Management during the latent phase of the first stage of labour is controversial due to the limited number of published studies. Cohort studies have consistently shown that women presenting to the hospital in the latent phase of labour experience increased obstetrical interventions (e.g., epidural analgesia, oxytocin use, Caesarean delivery) compared with women presenting in active labour.30–32 However, because of the observational nature of these studies, it is unclear whether the increased level of intervention is due to prolonged exposure to the hospital environment or to underlying labour abnormalities among women who present earlier. One small randomized trial by McNiven et al.33 found that women who received an early labour assessment in a triage area required less oxytocin and epidural analgesia and reported a more positive labour and birth experience compared with women directly admitted to the labour and delivery unit. The small sample size precluded the assessment of effects on Caesarean delivery and other important measures of maternal-newborn outcomes.

Early labour assessment and support at home from an obstetric nurse reduce the number of women presenting to the hospital in the latent phase and the number of women not coping with their contractions on admission compared with telephone support, but these measures did not reduce the use of obstetrical interventions such as oxytocin, epidural analgesia, or Caesarean delivery.34

Recommendation

1. Health care providers should delay term labour admission to the birthing unit until active labour (i.e., equal to or greater than 4 cm dilation) is established. (II-2A)

Active Phase of the First Stage of Labour

Partogram

Partograms are graphical records used during active labour to help visually assess labour progress by recording cervical dilatation and the descent of the presenting part, facilitating early detection of dystocia and timely intervention of amniotomy and oxytocin augmentation. For this purpose, some partograms include action lines to trigger the treatment of dystocia.

A 2013 Cochrane review that included 7706 women in 6 randomized trials35 found no difference between the use or non-use of a partogram related to outcomes of CS in women presenting in spontaneous labour at term, instrumental vaginal delivery, or an Apgar score less than 7 at 5 minutes. In the single high-quality trial performed in a higher-resourced setting, there were no significant differences between groups in these outcomes. When compared with a 4-hour action line, women in the 2-hour action line group were more likely to require oxytocin augmentation but showed no difference in Caesarean delivery or other maternal or neonatal outcomes. When the 3- and 4-hour action lines were compared, the CS rate was 70% lower in the 4-hour action-line group. Despite the routine use of a partogram in both low- and high-resourced settings, there is insufficient evidence that its use results in measurable clinical outcomes. However, given its widespread use as a documentation tool in monitoring maternal/fetal status and labour progress, the use of a partogram may contribute to overall team functioning and communication.

Recommendation

2. Documentation and communication of labour progress are important aspects of labour management. Labour and delivery units should establish local policy regarding labour documentation,
Ambulation and upright positioning

For women who do not receive epidural analgesia, ambulation, position change, and upright positions may reduce the length of the first stage of labour and operative delivery. A 2013 Cochrane review found that women randomly assigned to upright positions (walking or upright non-walking [e.g., sitting, standing, kneeling, squatting, and all fours]) compared with recumbent positions (supine, semi-recumbent, and lateral) experienced first stages that were 82 minutes shorter and lower rates of CS, were less likely to receive epidural analgesia, and delivered babies that were less likely to be admitted to neonatal intensive care. However, there was no difference in length of the second stage of labour or other outcomes related to the well-being of mothers and babies. Interestingly, for women who received epidural analgesia, there were no differences between those randomly assigned to upright positions versus recumbent positions for any of the outcomes examined in the review.

Recommendation

3. Women should be informed of the benefits of upright positioning in labour and encouraged and assisted to assume whatever positions they find most comfortable. (I-B)

Eating and drinking during labour

A 2013 Cochrane review on restricting oral fluid and food intake during labour examined women in active labour and at low risk of potentially requiring general anesthesia. The investigators compared restricting women to nothing except ice chips or sips of water or water alone with providing women with fluid and foods or the freedom to eat and drink at will and found no significant differences in CS, assisted vaginal births or Apgar scores. The pooled data were insufficient to assess for the incidence of the rare outcome of Mendelson’s syndrome (aspiration associated with general anesthesia). The authors concluded that there is no evidence of benefits or harms associated with restricting women’s access to fluids and foods during labour for women at low risk of potentially requiring a general anaesthetic. No studies have assessed the restriction of oral fluid in women with risk factors for induction of general anesthesia; the conclusion should not be extrapolated to non-low-risk populations.

Recommendation

5. Continuous labour support is recommended for all women in active labour. Each labour unit should aim to provide the opportunity for each woman to receive continuous 1-to-1 labour support. (I-A)

Amniotomy/artificial rupture of membranes

An RCT (n = 752) comparing early amniotomy alone with expectant care found no difference in the overall Caesarean rate or neonatal outcome. Even though there was a modest reduction in labour duration, investigators found more frequent abnormal fetal decelerations and CS performed in cases in which abnormal fetal surveillance was either the only or contributing indication in the amniotomy group. These findings suggest that in settings in which diagnosis of abnormal fetal surveillance is based primarily on electronic fetal monitoring, routine early amniotomy may increase CS for abnormal fetal monitoring. An updated 2013 Cochrane review examined routine first stage amniotomy

It is recognized that a healthy woman entering labour may develop complications resulting in a change of her risk status and labour management; clear communication and common understanding among care providers about her revised risk status are critical. Policies regarding oral intake in labouring women should be determined at each site by the health care team.

Recommendation

4. Women who are at low risk of requiring general anesthesia should have the choice to eat or drink as desired or tolerated in labour. (I-A)

Birthing companion/continuous emotional support

CLS is defined as non-medical care provided during labour that includes continuous presence, emotional support, comfort measures, advocacy, information, and advice. CLS may be provided by a trained person such as a doula, nurse, or midwife or from a friend or family member of the woman’s choice. A 2013 Cochrane review of over 15 000 women in low- and middle-resource settings showed that CLS increased the likelihood of vaginal delivery, lowered the risk of Caesarean delivery, reduced the use of epidural analgesia, and improved Apgar scores and maternal satisfaction. Subgroup analyses showed that CLS was most effective when the provider was not part of the hospital staff or from the women’s social network.

Recommendation

5. Continuous labour support is recommended for all women in active labour. Each labour unit should aim to provide the opportunity for each woman to receive continuous 1-to-1 labour support. (I-A)
compared with no amniotomy in 5583 women whose labour started spontaneously and when labour became prolonged. The findings showed no difference in the length of the first stage labour, CS, maternal satisfaction, or Appgar score less than 7 at 5 minutes, concluding that routine amniotomy should not be standard practice.

Early routine amniotomy and oxytocin augmentation were compared for the prevention or treatment of dystocia in a 2013 Cochrane review. The primary analysis that included all trials showed no difference in the risk of CS. However, subgroup analyses found that the use of amniotomy and oxytocin for slow labour progress in unselected women undergoing normal spontaneous labour were associated with a modest reduction in the CS rate and labour duration.

In normally progressing labour, routine amniotomy is of questionable benefit and may result in more frequent variable decelerations in fetal heart rate. If amniotomy is performed, it is necessary to ensure that the fetal head is well applied to the cervix (not bollottable) to minimize the risk of cord prolapse. If these conditions have been met, the woman is free to ambulate after amniotomy.

**Recommendation**

6. Amniotomy and oxytocin, in addition to other measures, should be considered once a diagnosis of dystocia has been made in either the first or second stage of labour. (I-B)

**Active Management of Labour**

The active management of labour was originally defined as including clear criteria for the diagnosis of labour (regular contractions with spontaneous rupture of membranes or complete cervical effacement), routine amniotomy in labour, close attention to progress in labour, and liberal use of high-dose oxytocin if cervical dilatation was less than 1 cm/hour. Observational studies by the initial advocates of active management demonstrated lower CS rates, a lower incidence of prolonged labour, better neonatal outcomes, and improved maternal satisfaction. Subsequent follow-up observational studies also supported these results.

Active management requires more interventions and creates a more medicalized birth process. A 2013 Cochrane review stated “Active management is associated with small reductions in the CS rate, but is highly prescriptive and interventional. It is possible that some components of the active management package are more effective than others. We therefore suggest that the term ‘active management of labour’ should not be used unless all components of the package of care were applied as originally described… Further work is required to determine the acceptability of active management to women in labour.”

**Summary Statement**

2. In low-risk nulliparous women in the active phase of labour (i.e., equal to or greater than 4 cm dilatation), progress of cervical dilatation greater than or equal to 0.5 cm/hour is considered normal. (II-2)

**Comfort Measures and Pain Relief**

Labour hurts. Using the McGill pain scale, the average pain in labour equals that of amputation of a digit. Women experience a wide range of pain during labour. The severity and tolerance of pain are unique to each labouring woman and cannot be predicted reliably prior to the occurrence of pain. Because pain and a woman’s response to it are individual, women need to be aware of a variety of strategies to assist with their management of pain. Using a pain scale to assess pain during labour helps to determine the need for offering interventions and the effectiveness of those interventions. It has been suggested that in addition to a pain scale, a coping scale be used. This differentiates those women able to cope with significant pain from those requiring intervention.

Some women in labour reach the limit of their pain tolerance. Women experiencing excessive pain or anxiety have high endogenous catecholamines. This produces a direct inhibitory effect on uterine contractility and establishes a vicious circle of poor uterine progress, leading to increased anxiety, leading to increased catecholamines, and leading to further impairment of progress. The relief of pain by effective support and analgesia may allow for release of the uterus from the constraints of the endogenous catecholamines and allow for progress in labour. High endogenous catecholamine levels may adversely affect uterine blood flow and therefore fetal oxygenation.

The management of pain during labour involves more than the simple and timely administration of the best anesthetic agent available. Successful control of pain during labour requires active management of the entire process. This pain management should begin with prenatal education and counselling. Measures to enhance comfort and reduce apprehension are required for the care of all women in labour. If appropriate measures are used early in the process of labour, analgesic needs decrease. Health care providers who care for women in labour need to be aware of all the available options for the prevention and
management of pain. When the health care team understands the indications, possible variations, and potential side effects, the woman and her family are able to make choices in a less stressful environment.

**Non-pharmacologic pain relief**

A 2006 Cochrane review on complementary and alternative therapies for labour pain management showed benefits in pain reduction from self-hypnosis and acupuncture. However, the study results were limited by small sample size. The efficacy of acupressure, aromatherapy, audio analgesia, and massage has not been established. The requirement for more 1-to-1 care in these situations may have influenced outcomes.51

A 2009 Cochrane review on TENS reported that women receiving TENS were less likely to report severe pain and most would use it again; however, there was no difference in pain scores, mode of delivery, duration of labour, use of other analgesia, or augmentation of labour.52 The analgesic effect of TENS was found to be weak.53

A 2009 Cochrane review of 12 RCTs evaluated immersion in water during labour. Water immersion was found to significantly reduce the use of epidural/spinal/paracervical analgesia and result in shorter duration of first stage labour among women compared with control patients. There was a reduction in the duration of the first stage of labour with no difference in assisted vaginal deliveries, CS, oxytocin use, perineal trauma, or maternal infection. Similarly, no difference was found in Apgar score less than 7 at 5 minutes, neonatal unit admissions, or neonatal infection rates. There was insufficient evidence about water immersion in the second stage of labour. Further research was recommended.54

A 2009 systematic review of 828 women found that those randomized to intracutaneous sterile water injections experienced significantly reduced visual analogue scale pain scores for up to 2 hours and a reduced CS rate (4.6%) compared with a saline comparison group (9.9%). However, the heterogeneity and quality of trials were weak, and the authors recommended a large RCT to validate their findings.55 Additional Cochrane review of intracutaneous injection of sterile water was found not to be effective for low back or any other labour pain.56

<table>
<thead>
<tr>
<th>Recommendations</th>
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<tr>
<td>7. <strong>Women and health care providers should have information about coping strategies for early labour and mechanisms for accessing support from caregivers.</strong> (III-A)</td>
</tr>
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<th>Pharmacological methods—systemic</th>
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Providing satisfactory and effective pain relief in labour is a primary responsibility of the health care team. Having thorough knowledge of the pharmacology of the drugs used during labour is necessary to promote appropriate and satisfactory care and to limit side effects. It is important to understand the following:

- Sedative and hypnotic drugs do not provide pain relief and may increase respiratory depression when given in conjunction with opioids. However, in women with high levels of anxiety not alleviated by support and reassurance, sedative drugs can reduce episodes of nausea/vomiting and enhance the analgesia obtained with opioids.
- Anticholinergic side effects are common with antiemetics and sedatives, and care should be directed at recognizing and addressing discomforts.
- No drug is devoid of maternal or fetal side effects. With almost all pharmaceutical therapies, some amount of the drug reaches the fetus. This may interfere with the success of breastfeeding.
- Although all opioids provide analgesic effects, some opioids have active metabolites that may have a very prolonged half-life in the newborn (e.g., meperidine).
- Women can be medicated with opioids or an inhalational agent just before birth without causing significant respiratory depression in the newborn.

When the health care team understands the indications, limitations, and side effects of these drugs, adverse maternal and fetal outcomes can be minimized. Ideally, the care provider should discuss options and provide written information and links to other sources of information, in appropriate languages, regarding medications, possible variations, and potential side effects during the antenatal period. This allows the woman and her family the opportunity to make decisions in a less stressful environment. When labour occurs, appropriate and individually desired non-pharmacological or pharmacological agents may be used.
Nitrous oxide. Entonox is a mixture of 50% nitrous oxide and 50% oxygen that provides mild to moderate analgesia. It must be self-administered for safety reasons via a demand-valve and used with scavenging in a well-ventilated room for workplace safety. Deep inhalation should begin as soon as the woman is aware of the onset of a contraction for maximal benefit. It is often useful for the woman who has coped well until transition and then requires some form of analgesia for a short time. It may also be used as an adjunct during other procedures, such as placement of a pudendal block or perineal repair.

Opioids. Opioids are widely used in many centres. A variety of options are available, and opioids may be given intramuscularly, subcutaneously, or by repeated IV boluses, including patient-controlled administration. The IV route has the advantage of a rapid effect when needed. Opioids may be usefully combined with an antemetic. A 2010 Cochrane review found that parenteral opioids provide some pain relief in labour and were associated with maternal side effects of nausea, vomiting, and drowsiness. Overall, the trials were of low quality evidence. There was insufficient evidence to recommend which opioid drug provides the best pain relief with the least adverse outcomes.

A number of studies have reported on the negative neonatal effects of opioids with a longer half-life (e.g., meperidine). The negative effects are based on the active metabolite half-life in the newborn that may last 2 to 3 days and may include respiratory depression and neurobehavioural outcomes affecting regulation of states of consciousness and reflexes. The use of meperidine is discouraged, whereas other opioids with a shorter half-life, such as morphine or fentanyl, are preferred. It is important to note that even though fentanyl is a short-acting opioid, it has a long half-life once maximum doses have been used.

When pharmacological agents are used for pain control during labour, guidelines regarding their safe and effective use should be available for all staff. These guidelines should include the method of action, average and maximum doses, possible maternal and fetal side effects, precautions for use, and resuscitative measures for each drug. When any opioid is used, an opioid antagonist (e.g., naloxone) and resuscitation capabilities should be available, with a clear protocol on how to administer the naloxone, including appropriate dosing (because complete reversal of analgesia is not a desired outcome).

**Summary Statement**

3. Each labour unit should have a guideline for opioid use during labour that includes the method of action, average and maximum doses, route of administration, possible maternal and fetal side effects, precautions, and opioid antagonists and resuscitative measures for each drug. (III)

Peripheral nerve blocks. The local anesthetic agents typically used for labour analgesia are lidocaine and bupivacaine. Providers using these agents need to be knowledgeable about the maximum safe doses, how to calculate the dose, and the signs/symptoms of early local anesthetic toxicity. Action should be taken to prevent toxicity with all local anesthetics. Protocols for managing local anesthetic toxicity should be in place.

Pudendal nerve blocks. Pudendal nerve blocks are used for analgesia of the perineum in the second stage of labour. This form of analgesia can be very useful and should be considered when other regional analgesia is not available. Local anesthesia with epinephrine allows for the safe administration of larger volumes of anesthetic, leading to greater effectiveness as the epinephrine limits the peak systemic levels in the mother and therefore the amount transferred to the fetus. An injection of 10 mL of 1% lidocaine or equivalent is made in 2 locations through or just inferior to the sacrospinal ligament, just medial to the ischial spine on each side. The effect is usually felt within 3 to 4 minutes.

Perineal infiltration. Perineal infiltration is used for repair of lacerations and episiotomy. Generous and widespread infiltration should be used. Use of an agent with epinephrine is helpful. Care should be taken to not inject intravascularly or exceed the maximum dose. The maximum dose of plain lidocaine is 4 to 5 mg/kg or a single dose of 300 mg of a 1% solution. The maximum dose of lidocaine with epinephrine is 7 mg/kg or a 500 mg single dose (Table 3).

Regional analgesia/anesthesia

Epidural block. Epidural block can provide effective pain relief throughout all stages of labour and delivery. The hormonal response to pain includes a rise in endogenous catecholamines. The effective relief of pain lowers epinephrine concentrations and may result in improved uterine contractions and possibly improved placental perfusion. A particular benefit of epidural analgesia exists for women with labour dystocia and who require augmentation. Effective pain relief may increase the acceptance of augmentation and the likelihood of subsequent vaginal delivery.
A 2011 Cochrane review involving 9658 women showed that compared with an opiate or no analgesia, epidural analgesia provided superior pain relief in labour, a small decrease in neonatal acidosis, and less need for naloxone. However, epidural analgesia was associated with increased risk of assisted vaginal birth, maternal hypotension, motor blockade, maternal fever, urinary retention, longer second stage of labour, oxytocin administration, and increased risk of CS for fetal distress. There was no significant difference in overall risk of CS, long-term backache, Apgar score less than 7 at 5 minutes, and maternal satisfaction with pain relief. A separate 2012 meta-analysis of RCTs involving 4667 women showed increased neonatal septic workup and antibiotic treatment in women receiving epidural analgesia.

Even though it provides excellent pain relief, epidural analgesia often slows second stage labour and results in motor blockade, which interfere with mobility and maternal pushing efforts.

Modern epidural techniques use lower concentration of local anesthetics (0.1% or less) than those used previously (up to 0.25%). In a meta-analysis of 2000 women, low-dose epidurals were as effective as high-dose epidurals at relieving pain but were less likely to cause motor blockade and urinary retention or to interfere with ambulation. Compared with low-dose epidurals, high-dose epidurals are more likely to cause prolongation of the second stage of labour. This may be due to blockage of the natural increase in endogenous oxytocin that occurs in the second stage. Oxytocin augmentation may be necessary if contractions are infrequent or ineffective. Relaxation of the pelvic floor musculature may result in persistent fetal head malposition. Low-dose epidurals are preferred because they lead to less motor blockade and therefore less malposition, a shorter second stage of labour, and less hypotension. Women who received low-dose epidurals were less likely to require assisted vaginal birth, although there was no difference in the CS rate.

Maintaining an upright position and mobility during labour has been shown to be beneficial in promoting vaginal birth. Mobility is associated with greater maternal satisfaction when a labour epidural is providing analgesia, although that may be due to the typical manner of managing a mobile labour epidural—with PCEA. Mobility does not necessarily mean freely ambulating; it means labouring in a non-recumbent position, attempting to void spontaneously, and using a non-lithotomy delivery position. Ambulation, per se, with a labour epidural has not been shown to alter birth outcome; however, all of the studies were flawed by the fact that few women actually ambulated for a significant period following epidural insertion. Weiniger et al. noted that women who received a low-dose epidural and who were encouraged and able to ambulate to the toilet during labour had a significantly improved ability to empty the bladder, avoiding urinary catheterization.

Promoting mobility may be more beneficial than focusing on actual walking after receiving an epidural. Allowing for mobility means tailoring the labour epidural to minimize motor blockade. Even though no “ideal” epidural solution mixture or PCEA program has been found, the basic principles include the following: low-dose local anesthetic/opioid mixture with a low background infusion and generous patient-controlled bolus function to maintain analgesia without causing cumulative motor blockade.

PCEA has been shown to produce greater maternal satisfaction and excellent analgesia despite the use of low-dose/very low-dose epidural solutions compared with traditional continuous epidural infusion. A 2002 meta-analysis of 9 studies (n = 640) demonstrated a lower anesthetic dose and less motor blockade with PCEA compared with continuous epidural infusion.

A 2009 randomized trial of 12,793 nulliparous women reported that epidural initiation early in the first stage of spontaneous labour (cervical dilatation of at least 1.0 cm) does not seem to prolong labour or increase the CS rate compared with later initiation at a cervical dilatation of 4.0 cm or greater. A systematic review of over 15,000 nulliparas compared early versus late initiation of labour epidural; early epidural was administered prior to 4 to 5 cm, whereas late epidural was administered after 4 to 5 cm cervical dilatation. The investigators found no difference in all measured outcomes, including CS, instrumental births, duration of second stage of labour, Apgar scores, and umbilical arterial or umbilical venous pH.

Summary Statement

4. Epidural analgesia provides the most effective pain relief for women in labour. The timing of initiation of labour epidural is dependent on the woman’s choice once the diagnosis of labour has been established. (I)

Recommendations

10. The use of meperidine as labour analgesia should be avoided due to its long-acting active metabolites and negative effects on neonatal behaviours. (II-2B)
11. Low dose epidural, when available, is preferred over high dose epidural for labour analgesia and in promoting mobility in labour. (I-A)

12. Women who receive an epidural should be encouraged to maintain mobility and flexibility in positions of comfort throughout labour. (I-B)

SECOND STAGE LABOUR MANAGEMENT

Position in Second Stage of Labour

A 2005 meta-analysis reported limited studies (n = 281) comparing the upright versus recumbent position in the second stage of labour. With an upright position, there was a non-significant reduction in instrumental and Caesarean births and a statistically significant reduction in labour duration.75 Two Cochrane reviews compared upright versus the recumbent position in the second stage of labour in women who did or did not receive epidural analgesia. No difference in outcomes was found for women who received epidural analgesia, although the sample size was small. For women without an epidural, upright posture reduced the risk of operative vaginal deliveries, episiotomy, and abnormal fetal heart rate pattern but increased the likelihood of second-degree perineal laceration and blood loss over 500 mL.76,77

Epidural Analgesia

Continue the epidural. Discontinuing an epidural in the second stage of labour to allow “effective” pushing often results in the sudden return of pain. This practice may be worse than if no relief had been provided at all. The woman may become so distressed by the pain that she cannot push effectively. Maintaining the epidural does not significantly increase the incidence of assisted vaginal birth.78,79 A secondary analysis of early versus late pushing in an RCT revealed an increased incidence of Caesarean birth, mid-pelvic procedures, and third- and fourth-degree tears for women who reported suboptimal pain control during the second stage of labour in the early pushing group.80

Recommendation

13. Once an epidural has been established, the infusion should be continued until completion of the third stage of labour. (I-A)

Delayed Pushing

The 2000 PEOPLE trial randomized 1862 nulliparous women who received an epidural at full dilatation to immediate pushing or delayed pushing for a maximum of 2 hours. Women in the delayed pushing group experienced more spontaneous and fewer difficult births. This was most marked in women whose babies were above station +2 (zero station at the level of the ischial spines) or in a non-occiput anterior position during the early second stage.81,82 In women who do or do not receive epidural anesthesia, waiting up to 2 hours prior to the onset of pushing is appropriate in the presence of continued descent of the head and fetal and maternal status are satisfactory.82,83

Duration of Pushing

There is a lack of quality evidence on defined time limits for the active second stage once it has commenced. Several cohort studies examining the duration of the second stage of labour found no evidence of adverse neonatal outcomes or increased maternal morbidity and operative deliveries with longer second stages.84—86 However, most studies did not distinguish between the passive and active phases of the second stage of labour. It appeared that the duration of active pushing has more direct impact on maternal and neonatal outcomes than does the total duration of the second stage of labour.87,88 In light of these findings, documentation of the time of the onset of active pushing is important; it is reasonable that hourly reassessment of progress in fetal descent and rotation should be made to determine whether intervention or assisted birth is required. Table 483,89 describes the recommended practices for pushing by parity and use of epidural anesthesia. Oxytocin administration may be indicated if there is evidence of slow or lack of progress or when contractions are assessed as being inadequate (e.g., < 200 Montevideo units).

Total Duration of the Second Stage of Labour

Menticoglou et al.90 studied the duration of the second stage of labour and perinatal outcomes. They found no association between the duration of the second stage of labour and low Apgar scores at 5 minutes, neonatal seizures, or admission to neonatal intensive care units. Limited evidence makes it difficult to set a time limit for

Table 3. Maximum dose of local anesthetic peripheral nerve blocks and infiltration

<table>
<thead>
<tr>
<th>Agent</th>
<th>Lidocaine</th>
<th>Lidocaine with epinephrine</th>
<th>Bupivacaine</th>
<th>Bupivacaine with epinephrine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose</td>
<td>4 to 5 mg/kg</td>
<td>7 mg/kg</td>
<td>2.5 mg/kg</td>
<td>3 mg/kg</td>
</tr>
<tr>
<td>Maximum single dose</td>
<td>300 mg</td>
<td>500 mg</td>
<td>175 mg</td>
<td>225 mg</td>
</tr>
</tbody>
</table>

NOTE: Conversion formula % to mg/mL: multiply the % concentration by 10 (i.e., 1% = 10 mg/mL).
the duration of the second stage of labour. It is suggested that assessment of maternal status, fetal status, and rate of descent should be the basis of individualizing appropriate management. It is reasonable to consider intervention when there is no further descent of the fetus despite optimum uterine contractions and maternal expulsive efforts.

The effect of pre-pregnancy BMI on the duration of the second stage of labour is unclear. Some authors reported no significant difference in duration of the second stage of labour by BMI, whereas other studies have reported a reduced length of the second stage in obese women. The interpretation of any estimates based on second stage characteristics is challenging. This is because the group of women that progresses to the second stage of labour excludes women who had a Caesarean delivery during the first stage. Thus, any observed differences in characteristics between obese and non-obese women in the second stage may be due to selection factors, limiting the generalizability of findings.

### Recommendations

<table>
<thead>
<tr>
<th>Nulliparous</th>
<th>Parous</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total duration</strong></td>
<td><strong>14.</strong> Pushing, as a component of second stage progress, may commence when the cervix is fully dilated, the presenting part is confirmed to be engaged, and the woman feels an urge to push. (III-A)</td>
</tr>
<tr>
<td><strong>Passive second stage</strong></td>
<td><strong>15.</strong> Delayed pushing is preferred when the woman has no urge to push, particularly if the presenting part is above +2 station or in a non-OA position and the urge to push is absent. Encourage waiting to allow passive descent.</td>
</tr>
<tr>
<td><strong>Commence pushing</strong></td>
<td><strong>16.</strong> Delay of pushing according to parity and the presence or absence of an epidural should follow the time limits described in the text unless there are extenuating circumstances. (II-2B)</td>
</tr>
<tr>
<td><strong>Assessment</strong></td>
<td><strong>17.</strong> The method of pushing, spontaneous or directed with Valsalva manoeuvre, should be chosen by the woman’s own preference. Directed pushing may assist with the final expulsion of the head. (II-2B)</td>
</tr>
</tbody>
</table>

**METHOD OF PUSHING**

A meta-analysis of 3 trials comparing Valsalva and spontaneous pushing in 425 nulliparous women who did not receive labour epidural found no difference in rates of operative deliveries, perineal repair, and PPH. For the Valsalva technique, a woman is instructed to take a deep breath at the start of the contraction and hold her breath and push hard for the duration of the contraction. In the spontaneous pushing method, the woman is self-directed.

### Table 4. Recommended practices in second stage of labour by parity and use of epidural analgesia (after full cervical dilatation and when power is adequate)

<table>
<thead>
<tr>
<th>Nulliparous</th>
<th>Parous</th>
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<td><strong>Total duration</strong></td>
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</tr>
</tbody>
</table>

**OA:** Occiput anterior.

*Continuing beyond the following time limits should be carefully evaluated, and consideration should be given to expedite delivery. Extending these time limits may be appropriate in the presence of continued descent of the head, when maternal status and fetal surveillance are normal, and when spontaneous vaginal birth is imminent.†Waiting for up to the period indicated prior to the onset of pushing is appropriate in the presence of continued descent of the head and if fetal and maternal conditions are satisfactory.

and may push with an open glottis, using an intermittent exhalation or vocalization technique. Although a significant reduction in duration of second stage labour by 18.59 minutes was found in the Valsalva group, the mean difference diminished to 9.75 minutes after sensitivity analyses. Women who used Valsalva pushing showed a significant decrease in urodynamic factors in first urge to void and bladder capacity measured at 3 months postpartum. There were no differences in other important maternal and newborn outcomes. The authors concluded that the Valsalva pushing technique should not be routinely used until more evidence is available.96

EPISIOTOMY AND PERINEAL MANAGEMENT

A 2009 Cochrane review of 8 studies related to episiotomy for vaginal birth concluded that restrictive episiotomy policies appear to have a number of benefits compared with routine episiotomy policies. There was less posterior perineal trauma, less suturing, and fewer complications, with no difference for most pain measures or severe vaginal and/or perineal trauma. However, there was an increased risk of anterior perineal trauma with a restrictive episiotomy policy.97 When the perineum is preventing delivery, particularly if the fetal heart rate is abnormal, an episiotomy may expedite a vaginal birth, although this has not been examined prospectively.

Although routine episiotomy has been shown to cause more harm than good, selective mediolateral episiotomy should be considered in women who are considered at an increased risk of OASIS, such as nulliparous women requiring assisted vaginal birth or those with a history of prior OASIS. Randomized evidence is limited but corroborates observational evidence that more liberal (but not routine) use of mediolateral episiotomy prevents OASIS at assisted vaginal births, particularly with forceps.99–101

The angle at which a mediolateral episiotomy is cut is important. An observational study showed that the angle of an episiotomy from midline when performed at crowning decreased by 20 degrees on average after delivery.102 An episiotomy performed at 45 degrees leaves an incision after delivery at 25 degrees from midline—very close to the anal sphincter. To avoid causing OASIS, an episiotomy should be performed more than 60 degrees from midline when the head is crowning (i.e., less than 30 degrees from horizontal). Midline episiotomy increases the risk of anal sphincter injury.

Quality improvement efforts in large regions of Norway over the past decade have succeeded in reducing the incidence of OASIS from 4% to less than 2%.103 The key components have been controlled, slow delivery of the crowning fetal head and selective use of mediolateral episiotomy.

A 2011 Cochrane review (n = 1525) of warm perineal compresses in labour versus no intervention showed a reduction in third- and fourth-degree perineal tears from 5% to 2.5%.104 Investigators also found no difference in the reduction of perineal trauma between a hands-on and hands-off technique on the perineum. Due to the high clinical heterogeneity and poorly described perineal techniques in the studies, it was not possible to conduct planned analyses on outcomes. The only common theme was that a slow, controlled delivery of the fetal head was used to facilitate delivery.

### Recommendation

18. Avoid the use of routine episiotomy in spontaneous vaginal births. (I-A)

**Perineal Repair**

A 2010 Cochrane review involving 10 171 women demonstrated decreased pain and need for re-suturing with synthetic versus catgut suture material for episiotomy and perineal tear repairs. Rapidly absorbable synthetic suture needed to be removed less often than did regular synthetic suture. There were no differences in long-term pain or dyspareunia.105

A 2012 Cochrane review involving 8184 women demonstrated decreased analgesia use, less pain for up to 10 days, and reduced need for suture removal with continuous versus interrupted perineal repair technique. There was no difference in long-term pain or need for re-suturing.106

A randomized trial of 147 women with OASIS found that a single 1 g IV dose of cefotetan or cefoxitin given during repair reduced the incidence of perineal complications from 24% to 8% (P = 0.037).107 The evidence in this 1 study may not be sufficient to recommend routine antibiotic prophylaxis for third- and fourth-degree lacerations after delivery.

### THIRD STAGE LABOUR MANAGEMENT

AMTSL involves a package of interventions that includes administering prophylactic uterotonics, early cord clamping, and CCT to assist in placental expulsion and to prevent or reduce blood loss. Personnel with the training and skills to actively manage the third stage of labour should be in attendance. Even though an SOGC guideline recommended AMTSL as a package of care in 2009, the package
of 3 interventions is no longer recommended for all women. A 2015 Cochrane review of AMTSL involving 8247 women, in all but 1 high-income countries, found that compared with expectant management, active management demonstrated a reduction in PPH of more than 1000 mL and in the maternal hemoglobin level of less than 9 g/dL at 24 to 72 hours after delivery, regardless of the woman’s bleeding risk profile. Although AMTSL reduced the risk of bleeding greater than 1000 mL and blood transfusions in a mixed risk population, it also demonstrated a statistically significant increase in postpartum hypertension, pain, and return to the hospital due to bleeding. In addition, AMTSL is associated with a lower average birth weight, likely as a result of reduction in the neonate’s blood volume from early cord clamping. No statistical difference was identified between the groups in the mean length of the third stage of labour, manual or surgical removal of retained products, or maternal blood transfusion. Overall, high-quality evidence was lacking and more studies are needed. The authors concluded that AMTSL carried both benefits and harms and that the individual components of AMTSL should be evaluated separately to determine whether all components are required to reduce PPH or which component confers the most benefit.

Routine Use of Prophylactic Uterotonics
Recent evidence in a 2013 Cochrane review of 20 trials involving 10 806 women showed that prophylactic oxytocin at any dose decreases both PPH greater than 500 mL and the need for therapeutic uterotonics compared with placebo and ergot alkaloids. Prophylactic oxytocin is preferred over ergot alkaloids for prevention of PPH because it has minimal side effects. The benefit of prophylactic oxytocin in reducing PPH greater than 500 mL was found regardless of the route of delivery, the management of the third stage labour, or the dose of oxytocin given. The benefits of prophylactic oxytocin associated with decreased use of therapeutic uterotonics was seen only in trials in which oxytocin was given in the context of AMTSL, delivered intravenously, and administered as a 10 IU dose slow IV bolus. If an IV is not available, an intramuscular dose of 10 IU offers similar clinical benefit in reducing blood loss greater than 500 mL and a non-significant trend in reduced use of therapeutic uterotonics. Prophylactic oxytocin administered as an IV infusion is preferred over a rapid bolus IV due to potential adverse maternal cardiovascular effects and potential placental separation but retention due to entrapment. The effect of the timing of oxytocin administration as a prophylactic to prevent PPH was studied in a 2010 Cochrane review of 3 trials involving 1671 women. Investigators found that administration of oxytocin before and after the delivery of the placenta does not affect the risk of PPH greater than 500 mL, rate of retained placenta, third stage labour duration, and use of additional uterotonics.

Controlled Cord Traction
After delivery of the baby, the uterus continues to contract. Once there is evidence of placental separation, traction is applied to the umbilical cord with counter pressure to the suprapubic area on the uterus until the placenta delivers. Until recently, CCT was not studied independently in relation to the prevention of PPH. A 2015 Cochrane review involving 27 665 women showed that CCT is associated with reduced blood loss of 500 mL or more and less manual removal of the placenta; the latter occurred mainly in settings in which ergometrine was used routinely in the third stage of labour. Although CCT can be routinely offered during the third stage of labour, the authors cautioned that it should only be applied in settings in which the birth attendant has the necessary skills.

Timing of Cord Clamping
It appears that the adverse effects of reduced placental transfusion can be decreased if late cord clamping is practised and is equally beneficial in both term and preterm births. Delaying cord clamping by at least 60 to 180 seconds is associated with less need for transfusion for anaemia, less intraventricular hemorrhage, and less risk of necrotizing enterocolitis in non-resuscitated premature infants under 37 weeks’ gestation compared with immediate clamping.

In a 2013 Cochrane review that included a total of 3911 women and neonates at term, late cord clamping (> 60 seconds) was associated with enhanced hemoglobin levels and iron stores in infants for up to 6 months compared with the early cord clamping (< 60 seconds) group. There were no significant differences in maternal outcomes in terms of severe PPH or blood loss greater than 500 mL. Although fewer neonates in the early cord clamping group required phototherapy for jaundice, in settings where there is ready access of phototherapy for treatment of jaundice, the authors concluded that late cord clamping is warranted for healthy term infants.

Recommendations
19. Prophylactic oxytocics should be given after the delivery of the baby. (I-A)
20. In term and preterm infants who do not require neonatal resuscitation, delayed umbilical cord clamping for 60 seconds is recommended irrespective of the mode of delivery. (I-B)
Dystocia is the most common problem associated with labour and primarily affects nulliparous women. Even though the diagnosis of active labour requires assessment of uterine activity and cervical status, the diagnosis of dystocia first requires the confirmation of active labour. A Dublin study demonstrated a decrease in dystocia when active management of labour principles were followed, including the use of specific criteria to diagnose labour to avoid inappropriate intervention in the pre-active labour phase. Dystocia cannot be diagnosed prior to the onset of labour or during the latent phase of labour (before 4 cm); CS carried out at this time for an indication of dystocia is inappropriate.

Definition and Diagnosis of Dystocia
Dystocia is defined as delayed or arrested progress in labour, irrespective of causes. Dilatation of less than 0.5 cm/hour over 4 hours or no cervical change over 2 hours in the active first stage or greater than 1 hour of active pushing and no descent of the presenting part in the second stage is well below the 5th percentile for a population. It is associated with increased CS, maternal stress and anxiety, maternal infection, and PPH.

Recommendation
21. Dystocia should not be diagnosed prior to the onset of the active phase of the first stage of labour or before the cervix is at least 4 cm dilated. (II-2D)

Management of Dystocia in the First Stage of Labour
Oxytocin
In the event of dystocia due to inadequate power despite appropriate analgesia, hydration, and rest with or without amniotomy, oxytocin is indicated to achieve adequate contractions before operative delivery is considered. Principal concerns about the use of oxytocin are fetal compromise and uterine rupture. It must be remembered that it is not oxytocin that causes the problem but rather excessive contractions. The correct use of oxytocin achieves adequate contractions while avoiding excessive uterine activity that could compromise the fetus or cause uterine rupture.

Even with close titration of oxytocin, excess uterine activity can occur. All labour and delivery units must be prepared to manage uterine tachysystole whether or not it is associated with oxytocin use. This is outlined in the Clinical Practice Guideline on the induction of labour.

Complications of oxytocin. Table 5 describes possible complications of oxytocin administration, their mechanism of occurrence, and the preventive management associated with the use of oxytocin.

Sensitivity to oxytocin. Each woman’s uterus varies in its sensitivity to oxytocin. Even in the same uterus, the sensitivity may change during the course of labour. The dose used must be sufficient to achieve adequate contractions. Protocols or guidelines for the administration of oxytocin vary, but many suggest starting with a low dose followed by small increments at intervals of 30 minutes. The starting incremental dosages for augmentation may be less than those used for induction. Every obstetrical unit must have an identified and accessible protocol that includes a starting dose, increment interval, and maximum dose. Consistent use of one standard method to infuse oxytocin in any one obstetrical unit is recommended. The dose should be ordered and recorded as milliunits/minute, not as volume of infusion. For example, an obstetrical unit may administer an infusion solution of 30 U of oxytocin in 500 mL saline; thus the dose of oxytocin in milliunits/minute equals the volume of infusion in mL/hour. Therefore, conversion calculations of dose to volume of the infusion pump need not be performed. Electronic fetal monitoring should be initiated or continued when oxytocin is started.

IV oxytocin can be administered using a low- or high-dose protocol. The choice of protocol should be based on the relative risks of uterine rupture, sensitivity to oxytocin, and the likelihood of placental compromise. Any oxytocin protocol used should be assessed against uterine response and the fetus’s tolerance of associated contractions. If an early adverse uterine response (tachysystole) is noted with a high-dose protocol, then a low-dose protocol should be used.

Table 5. Complications of Oxytocin

<table>
<thead>
<tr>
<th>Adverse effects</th>
<th>Mechanism</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal compromise</td>
<td>Tachysystole</td>
<td>Correct dose</td>
</tr>
<tr>
<td>Uterine rupture</td>
<td>Tachysystole</td>
<td>Correct dose</td>
</tr>
<tr>
<td>Water intoxication</td>
<td>ADH effect</td>
<td>Use crystalloid IV solution with concentrated oxytocin to limit the volume of water infused</td>
</tr>
<tr>
<td>Hypotension</td>
<td>Vasodilatation</td>
<td>Avoid IV bolus injection, including for AMTSL</td>
</tr>
</tbody>
</table>

ADH: Antidiuretic hormone.
A 2010 meta-analysis of RCTs including 5400 women concluded that high-dose oxytocin protocols were associated with a lower CS rate than were low-dose protocols. Tachysystole was more common with high-dose protocols, but there was no difference in maternal or neonatal morbidity. Low dose was defined as 1 to 2 mU/min increments, and high-dose was defined as $\geq 4$ mU/min increments. This meta-analysis was dominated by studies that included only nulliparous women. Evidence specific to parous women or women with a prior CS scar is lacking. Therefore it may be prudent to use a low-dose protocol in women labouring with a prior CS or other uterine surgery because of a potential increase in the risk of uterine rupture. It is also prudent to use a low-dose protocol in grand multiparous women because of their increased sensitivity to oxytocin and women with suspected fetal growth restriction due to risks of placental insufficiency (Table 6).

### Oxytocin and Epidural

There is limited evidence to determine whether high-dose oxytocin regimens should be used for labour augmentation among women who have received an epidural. One large, high-quality, contemporary observational study from the United States and several smaller RCTs compared high- and low-dose oxytocin augmentation protocols in women with high (67% to 94% and higher) epidural use. One of these trials evaluated high-dose oxytocin as part of an active management of labour intervention, decreasing the applicability of the results.

Based on available evidence, high-dose oxytocin for labour augmentation has consistently been shown to shorten labour duration compared with low-dose oxytocin. In the large observational study, the first stage of labour in women who received high-dose oxytocin ($\geq 4$ mU/min starting dose) was shortened by 1.3 hours (95% confidence interval 1.0 to 1.7 hours) compared with low-dose oxytocin (1 mU/min starting dose) after adjusting for potential confounders. However, evidence on the relationship between high-dose oxytocin for labour augmentation and Caesarean delivery is inconsistent. Although most studies reported a trend towards lower Caesarean delivery rates in women who received high-dose regimens, only 1 reached statistical significance. Nulliparous women and women who receive an epidural analgesia during labour are particularly likely to benefit from high- versus low-dose oxytocin augmentation. The clinical goal of oxytocin augmentation is to achieve an effective uterine contraction mechanism of 4 to 5 contractions in 10 minutes. If an IUPC is used, the goal is 200 or greater Montevideo units (e.g., 4 contractions of 50 to 60 mmHg in 10 minutes). Several studies have examined the optimal duration of oxytocin augmentation when labour dystocia or arrest occurs. A prospective cohort study evaluated labour progress in 220 nulliparous women and 99 parous women who entered labour spontaneously and subsequently were assessed as having unsatisfactory progress. Investigators found that in women who received oxytocin for a total of 8 hours, 38% delivered vaginally. In nulliparous women, the CS rate was 18% after 8 hours of oxytocin augmentation with no resulting adverse neonatal outcomes. Another study of over 500 women evaluated a mandated protocol of 4 hours or more of oxytocin augmentation before CS for active phase labour arrest. Investigators found that extending the minimum period of oxytocin augmentation from 2 to 4 to 6 hours increased the vaginal delivery rate without severe adverse maternal or neonatal outcomes. This was further corroborated in a similar study by the same researchers.

**Table 6. Clinical considerations for oxytocin augmentation protocol**

<table>
<thead>
<tr>
<th>Clinical considerations</th>
<th>Suggested oxytocin protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior CS</td>
<td>Low dose</td>
</tr>
<tr>
<td>Fetal growth restriction</td>
<td>Low dose</td>
</tr>
<tr>
<td>Parity $&gt;4$</td>
<td>Low dose</td>
</tr>
<tr>
<td>Parous augmentation, no epidural</td>
<td>Low dose</td>
</tr>
<tr>
<td>Parous induction</td>
<td>Low or high dose</td>
</tr>
<tr>
<td>Parous augmentation with epidural</td>
<td>Low or high dose</td>
</tr>
<tr>
<td>Nullipara augmentation, no epidural</td>
<td>Low dose</td>
</tr>
<tr>
<td>Nullipara induction</td>
<td>Low or high dose</td>
</tr>
<tr>
<td>Nullipara with epidural</td>
<td>Consider high dose</td>
</tr>
</tbody>
</table>

**Recommendation**

22. Oxytocin augmentation should be titrated to avoid tachysystole or excessive uterine activity and to produce a uterine contraction pattern of 4 to 5 contractions in 10 minutes (200 Montevideo units). A minimum of 4 to 6 hours of adequate uterine activity may be required to have the desired response. (I-A) It is recommended that every obstetrical unit have an identified and accessible protocol that include a starting dose, increment interval, and maximum dose. Consistent use of 1 standard approach to oxytocin administration in any 1 obstetrical unit should be considered. (III-A)
Management of Dystocia in the Second Stage of Labour

Prolonged second stage
In the presence of strong contractions, prolonged second stage of labour may be defined by the following:
- Nulliparous women: 3 hours with regional anesthesia or 2 hours without regional anesthesia
- Parous women: 2 hours with regional anesthesia or 1 hour without regional anesthesia

If no urge to push occurs after 1 hour of the second stage of labour, reassess the contractions and fetal presenting position and descent and consider the use of oxytocin if contractions are inadequate.

A population-based cohort analysis of 120,000 women identified an increase in the risk of maternal obstetrical trauma, postpartum hemorrhage, puerperal febrile morbidity, composite maternal morbidity, low 5-minute Apgar score, birth depression, admission to the neonatal intensive care unit, and composite perinatal morbidity as the duration of the second stage surpassed 3 hours in nulliparous women and 2 hours in parous women.\(^\text{131}\)

Recommen[...]

<table>
<thead>
<tr>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Operative delivery less than 2 hours after commencing pushing is not recommended provided, maternal status and fetal surveillance are normal. (III-D)</td>
</tr>
<tr>
<td>24. When the second stage exceeds the recommended time limits (see text), consideration should be given to expediting delivery. Extending these time limits may be appropriate in the presence of continued descent the head, satisfactory maternal and fetal status, and imminent vaginal birth. (II-2B)</td>
</tr>
<tr>
<td>25. High dose regimens have been shown to decrease labour duration compared with low dose regimens. (I-A) The lowest dose needed to produce normal progress is recommended to reduce the risk of tachysystole or excessive uterine activity and create a uterine contraction pattern of 3 to 5 contractions or 200 or more Montevideo units every 10 minutes. (IA)</td>
</tr>
</tbody>
</table>

MANAGEMENT SUMMARY

Prevention of Dystocia
- Encourage the use of prenatal education.
- Avoid unnecessary/non-indicated induction of labour.
- Admit only women in the active phase of labour (see definition in the previous text) to the hospital.
- Provide continuous support with non-hospital associated persons to labouring women.
- Use appropriate analgesia.

Management of Dystocia
- Assess the adequacy of labour progress.
  - Intervene when necessary.
    - Analgesia
    - Rest
    - Amniotomy
    - Augmentation
- For women who received an epidural analgesia, if inadequate labour progress is suspected, augment with early artificial rupture of membranes and IV oxytocin. A high-dose IV oxytocin protocol may be particularly beneficial.
- Intervene operatively when necessary.

SUMMARY
- Labour is a normal physiological process.
- Normal labour is enhanced with supportive care, delayed admission until active labour, comfort measures, appropriate pain management, and interventions only when necessary.
- There is an increasing trend towards induction of labour and an increase in CS primarily due to dystocia and repeat CS.
- Dystocia can only be diagnosed once active labour is established.

Interventions for dystocia may include analgesia, rest, amniotomy, augmentation, and assisted vaginal birth.

REFERENCES

SOGC CLINICAL PRACTICE GUIDELINE


