

Evidence-based labor management: before labor (Part 1)



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This is the first review of our evidence-based labor and delivery (L&D) series.¹ The aim of this article is to review the evidence for intervention before and in preparation for labor.

Material and Methods

We performed multiple MEDLINE, PubMed, EMBASE, and COCHRANE searches with the terms “labor,” “pregnancy,” “preparations,” “randomized trials,” plus each management aspect (eg, “perineal massage,” “pelvic floor muscle training,” “self-diagnosis,” “x-ray pelvimetry,” “sweeping of membranes,” “prediction of labor,” “place of birth,” “birth assistant,” “delayed admission”). The search was between 1966 and 2019 and was not restricted by language.

Aspects related to preparations before L&D are covered in this first article of the series (Table).¹ This review, as the others in this series, was limited to the healthy woman, carrying a singleton healthy gestation, usually in vertex presentation at term (37–41 6/7 weeks gestation). Other aspects of L&D management will be covered in future series.¹ Each retrieved randomized controlled trial (RCT), meta-analysis, Cochrane Review of RCTs, or other study was evaluated carefully, and

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In preparation for labor and delivery, there is high-quality evidence for providers to recommend perineal massage with oil for 5–10 minutes daily starting at 34 weeks until labor; ≥ 1 daily sets of repeated voluntary contractions of the pelvic floor muscles, performed at least several days of the week starting at approximately 30–32 weeks gestation; no x-ray pelvimetry; sweeping of membranes weekly starting at 37–38 weeks gestation; for women with a risk factor for abnormal outcome plans should be made to deliver in a hospital setting; for low-risk women, alongside birth center birth is associated with maternal benefits and higher satisfaction, compared with hospital birth; midwife-led care for low-risk women; continuous support by a professional such as doula, midwife, or nurse during labor; and training of birth attendants in low- and middle-income countries.

Key words: birth assistant, delayed admission, delivery, labor, pelvic floor muscle training, perineal massage, self-diagnosis, sweeping of membranes, x-ray pelvimetry

EDITOR'S CHOICE

any pertinent references from the manuscripts were obtained and reviewed as well. The highest level of evidence, which is usually the best metaanalysis of RCTs, was used for developing the recommendation. In the absence of RCTs that covered the intervention, analytic data were reviewed. In the absence of experimental or analytical data, observational data were evaluated. Each step of preparations before L&D was reviewed separately.

Strength of recommendation and quality of the evidence were assessed with the use of the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) guidelines.² Because this was a review of literature, this review was exempted from Institutional Review Board approval.

Results

Antenatal perineal massage from 34 weeks gestation until labor

Antenatal perineal massage from 34 weeks of gestation until labor with sweet almond oil for 5–10 minutes daily is associated with a reduction in the incidence of perineal trauma at delivery that requires suturing in women without a previous vaginal birth; women who

practice perineal massage are less likely to have an episiotomy. In women with previous vaginal birth, antenatal perineal massage is associated with less perineal pain at 3 months after delivery (Cochrane review: 4 RCTs; 2497 women).³

In summary, perineal massage with oil for 10 minutes daily starting at 34 weeks gestation until labor is recommended (strong recommendation).

Pelvic floor muscle training

Pelvic floor muscle training during pregnancy decreases the risk of postpartum urinary incontinence. Pelvic floor muscle training usually involves ≥ 1 daily sets of repeated voluntary contractions of the pelvic floor muscles that are performed on at least several days of the week, for at least 8 weeks gestation (Cochrane review: 38 RCTs; 9892 women).⁴

In summary, pelvic floor muscle training with 1 daily set of repeated voluntary contractions of the pelvic floor muscles, performed at least several days of the week starting at approximately 30–32 weeks until labor is recommended (strong recommendation).

Education regarding self-diagnosis of active labor and labor

Education regarding self-diagnosis of active labor and labor in general involves

➤ Related editorial, 100079.

AJOG MFM at a Glance

Why was this study conducted?

Recent level 1 evidence on interventions in preparations for labor and delivery has been published; however, no published updated and comprehensive guidance for the clinician was included or published, to our knowledge.

Key findings

In preparation for labor, pregnant women should be encouraged to perform perineal massage and voluntary contractions of the pelvic floor muscles and to receive sweeping of membranes. Women with risk factors for abnormal outcome should plan to deliver in a hospital setting; for low-risk women, alongside birth-center birth is associated with maternal benefits and higher satisfaction, compared with hospital birth. Labor and delivery for low-risk women who are treated by a midwife is beneficial, as is continuous support by a professional such as doula.

What does this study add to what is already known?

Our review adds an easy-to-use summary of the best evidence for interventions in preparations for labor and delivery to aid the clinician to implement the evidence-based recommendations.

instruction during pregnancy (eg, antenatal classes), which includes, for example, education on the detection of contractions and timing of presentation for assessment for false vs active labor. Education for self-diagnosis of active labor is associated with a decrease in the number of visits to the labor suite compared with no such education (RCT; 208 women).⁵ Education in antenatal classes is also associated with arriving to the L&D ward more often in active labor (RCT; 1193 women)⁶ and with the use of less epidural analgesia (RCT; 1087 women).⁷

In summary, education regarding self-diagnosis of active labor and labor in general in antenatal classes is recommended (weak recommendation).

X-ray pelvimetry

X-ray pelvimetry increases the incidence of cesarean delivery, with no reported benefit. Magnetic resonance imaging pelvimetry has not been studied in a RCT (Cochrane review: 5 RCTs; 1159 women).⁸

In summary, x-ray pelvimetry before labor is not recommended (strong recommendation).

Sweeping of membranes

Sweeping of membranes performed weekly, starting usually at approximately

37–38 weeks of gestation reduces the duration of pregnancy and reduces the frequency of pregnancy continuing beyond 41 weeks of gestation (Cochrane review: 22 RCTs; 2797 women).⁹ Sweeping of membranes usually involves inserting ≥ 1 finger between the cervix and the membranes and sweeping 360 degrees at least 2–4 times. There was no additional risk in group B streptococcus positive women, although only 1 RCT in the metaanalysis evaluated this subset of patients.⁹

In summary, sweeping of membranes weekly starting at approximately 37–38 weeks gestation is recommended (strong recommendation).

Prediction of onset of spontaneous labor

Prediction of onset of spontaneous labor has been attempted by several means. Human diurnal rhythms lead to a higher rate of starting labor in the evening and night hours.¹⁰ There is insufficient evidence to state whether meteorologic factors¹¹ or the lunar cycle¹² have effects on the onset of spontaneous labor. Instead, transvaginal ultrasound cervical length (TVU CL) has been shown to be the most accurate screening test in the prediction of the onset of spontaneous labor. TVU CL measured at 37–40 weeks of gestation has good accuracy in

the prediction of the onset of spontaneous labor (Figure).¹³ For example, a woman with a TVU CL of 5 mm at term has a 94% chance of going into spontaneous labor and deliver within 7 days, while a woman at term with a TVU CL of 40 mm has <20% chance of spontaneously delivering within 7 days (meta-analysis: 5 prospective studies; 735 women).¹³ There is insufficient evidence to evaluate whether this intervention is cost-effective.

In summary, TVU CL at approximately 37–38 weeks of gestation is useful if a prediction of spontaneous labor at term is desired (weak recommendation).

Place of birth

Place of birth is a controversial and delicate topic, and it is difficult to draw any clear recommendation. The choices include hospital, in-hospital birth center, free-standing birth center, and home. Birth-center birth is often referred to as “home-like” birth. In the United States, levels of maternal care¹⁴ and of neonatal care¹⁵ have been proposed to best counsel women about where to deliver their babies.

Planned home birth. Planned home birth has never been studied in an adequately powered RCT. The only RCT published on this subject randomly assigned only 11 women and is too small to draw any conclusions (RCT, 11 women).¹⁶ Women with risk factors for abnormal outcome should deliver in a hospital setting. Many non-RCT studies have found out-of-hospital births to be associated with a higher rate of perinatal morbidity (ie, seizures and neurologic morbidity) and of perinatal deaths (approximately 2–3 times as many), especially in nulliparous women.^{17,18} Generally, low-risk women who labor at home have approximately a 20–50% chance of having to be transferred to the hospital because of risks or complications arising during labor. The American College of Obstetricians and Gynecologists believes that hospitals and birth centers are the safest settings for birth.¹⁹

In summary, women with risk factor for abnormal outcome should plan to

TABLE

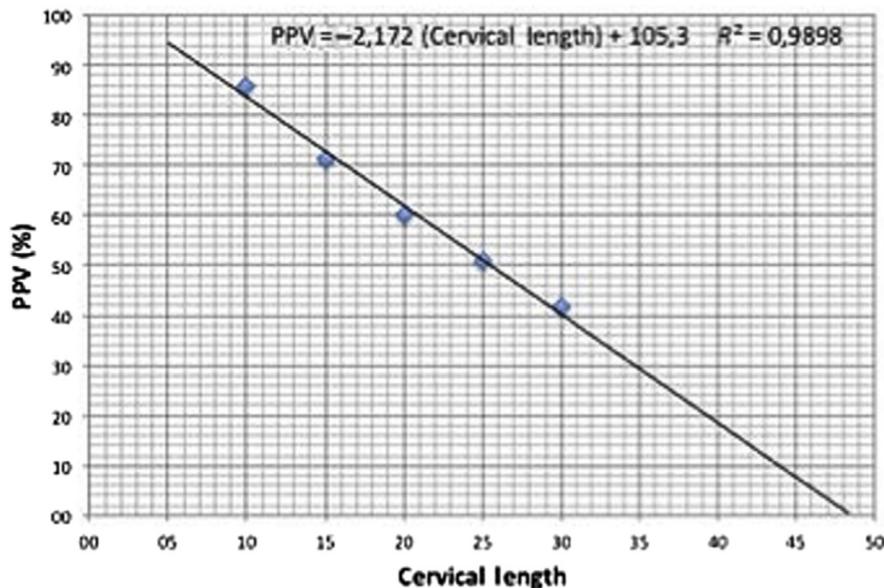
Evidenced-based recommendations for interventions before labor^a

Intervention	Recommendation	Quality of the evidence	Strength of recommendation	Reference	
Antenatal perineal massage	Perineal massage with oil for 5–10 minutes daily starting at 34 weeks until labor.	High	Strong	3	
Pelvic floor muscle training	One or more daily sets of repeated voluntary contractions of the pelvic floor muscles, performed at least several days of the week starting at approximately 30–32 weeks gestation.	High	Strong	4	
Education on self-diagnosis of active labor	Education regarding self-diagnosis of active labor and labor in general in antenatal classes.	Moderate	Weak	5–7	
X-ray pelvimetry	Do NOT perform x-ray pelvimetry before labor.	High	Strong	8	
Sweeping of membranes	Sweeping of membranes weekly, starting at 37–38 weeks gestation.	High	Strong	9	
Prediction of spontaneous labor	If prediction of spontaneous labor at term is desired, transvaginal ultrasound cervical length measurement at approximately 37–38 weeks gestation.	Moderate	Weak	13	
Home births	Women with a risk factor for abnormal outcome should plan to deliver in a hospital setting.	High	Strong	17, 18	
	Low-risk women who are contemplating planned home birth should be aware of the possible increase in perinatal morbidity and mortality rates.	Very low	Weak	16	
Birth center births	Women with a risk factor for abnormal outcome should plan to deliver in a hospital setting.	High	Strong	17, 18	
	Alongside	For low-risk women, alongside birth center birth is associated with maternal benefits and higher satisfaction, compared with hospital birth.	Moderate	Strong	20
	Freestanding	There is insufficient evidence to assess safety and effectiveness of freestanding birth centers.	Very low	Weak	—
Midwife-led care	Midwife-led care for low-risk women.	High	Strong	21	
Continuous support	Continuous support by a professional such as doula, midwife, or nurse during labor.	High	Strong	22	
Training of birth assistants	Training of birth attendants in low- and middle-income countries.	Moderate	Strong	23	
Teamwork training	Insufficient evidence to assess the effectiveness of team work training.	Very low	Weak	24	
Delayed admission	Admission to the hospital or birth center when the woman has regular painful contractions and the cervix is dilated >3 cm, if feasible and safe.	Low	Weak	25	

^a See text for more details.

Berghella. Evidence-based preparations for labor. AJOG MFM 2020.

FIGURE
Chances of spontaneous delivery



Chances (percentage, expressed as positive predictive value) of spontaneous delivery within 7 days by transvaginal ultrasound scan cervical length, in millimeters, measured at approximately 37–40 weeks gestation. For example, a woman with a transvaginal ultrasound cervical length of 5 mm at term has a 94% chance of going into spontaneous labor and deliver within 7 days, although a woman at term with a transvaginal ultrasound cervical length of 40 mm has <20% chance of spontaneously delivering within 7 days. (Data from¹³).

PPV, positive predictive value.

Berghella Evidence-based preparations for labor. *AJOG MFM* 2020.

deliver in a hospital setting (strong recommendation). Low-risk women who contemplate planned home birth should be aware of the increase in perinatal morbidity and mortality rates (weak recommendation).

Planned birth-center birth. Planned birth-center birth can occur for low-risk women in either a freestanding birth-center, not near a hospital, or in an alongside birth-center, inside or closely connected (ie, a corridor or bridge) to a hospital. There are no RCTs on freestanding birth-centers. Alongside birth-center birth decreases the use of intrapartum analgesia/anesthesia and episiotomy and increases the rates of spontaneous vaginal birth, preference for the same setting the next time, satisfaction with intrapartum care, and breastfeeding initiation and continuation to 6–8 weeks, compared with hospital births. There is a nonsignificant trend for a 67% higher

perinatal mortality rate in the alongside birth-center setting. Generally, low-risk women who labor in birth-centers have approximately a 20–50% (higher end for nulliparous women, lower end for multiparous women) chance of having to be transferred to the hospital because of risks or complications arising during labor (Cochrane review: 10 RCTs; 11,795 women).²⁰

In summary, women with risk factors for abnormal outcome should plan to deliver in a hospital setting. For low-risk women, alongside birth-center birth is associated with maternal benefits and higher satisfaction, compared with hospital birth (strong recommendation). There is insufficient evidence to assess safety and effectiveness of freestanding birth-centers (weak recommendation).

Attendant at birth

Attendant at birth choices include midwives, continuous support person such

as doulas or midwife, trained birth attendants, and physicians.

Midwife-led pregnancy care. Midwife-led pregnancy care has been studied mainly as a continuity-of-care model that includes both prenatal and intrapartum care by a midwife for low-risk women, compared with physician-led antepartum and intrapartum care. Midwife-led care is associated with lower incidences of preterm birth, use of regional anesthesia, episiotomy, operative vaginal delivery, and perinatal death; longer labors; higher rates of spontaneous vaginal delivery and maternal satisfaction. A woman cared for by a midwife while in labor has approximately a 10–40% chance of being transferred to physician care (Cochrane review: 15 RCTs; 17,674 women).²¹

In summary, midwife-led care is recommended for low-risk women (strong recommendation).

Continuous support by a professional. Continuous support by a professional (usually a doula, but also by midwives or nurses) during labor decreases the use of analgesia, shortens labor, increases spontaneous vaginal delivery, decreases operative vaginal and cesarean birth, is associated with lower incidence of low neonatal Apgar scores and maternal postpartum depression, and increases maternal satisfaction, compared with usual care without continuous support.²² The most effective form of support starts early in labor, is continuous, and is not provided by a member of the hospital staff. This support may include emotional support (continuous presence, reassurance, and praise) and information about labor progress. It may also include advice about coping techniques and comfort measures (comforting touch, massage, warm baths/showers, encouraging mobility, promoting adequate fluid intake and output) and speaking up when needed on behalf of the woman. A professional (eg, doula, midwife, or nurse) has better outcomes compared with a nonprofessional person chosen by the pregnant woman. The pregnant woman should be encouraged to select

her doula during pregnancy, to establish a relationship and discuss her and her partner's preferences and concerns before labor (Cochrane review: 26 RCTs; 15,858 women).²²

In summary, continuous support by a professional such as doula, midwife, or nurse during labor is recommended (strong recommendation).

Training of birth assistants. Training of birth assistants in low- and middle-income countries is associated with a 26% trend for a decrease in maternal mortality rates and a 30% trend for a decrease in perinatal mortality rates, compared with no such training, in 1 large Pakistani cluster RCT (RCT, 19,557 women).²³

In summary, training of birth attendants in low- and middle-income countries is recommended (strong recommendation).

Teamwork training

Teamwork training in L&D may consist of several aspects, which include crew resource management, communication, team huddles, debriefings, simulation, and leadership issues. Crew resource management involves training to develop habits of teams such as sharing a clear and valued vision, developing trust and confidence in each other, understanding leadership, and adoption of clear communication tools. For example, TeamSTEPPS (<https://www.ahrq.gov/teamstepps/index.html>) is a crew resource management program supported by the Agency for Healthcare Research and Quality (AHRQ) that provides support and tools for team training by addressing 4 main competencies: leadership, situation monitoring, mutual support, and communication. Teamwork training based mostly on crew resource management is associated with no effect on maternal and perinatal outcomes in a cluster RCT (RCT, 28,536 deliveries).²⁴

In summary, there is insufficient evidence to assess the effectiveness of teamwork training in L&D (weak recommendation).

Delayed admission

Delayed admission involves allowing admission to the L&D suite only after

certain criteria for active labor have been met. Only 1 RCT has evaluated this intervention.²⁵ Active labor was defined in this RCT as regular painful contractions and cervical dilation >3 cm. Compared with direct admission to hospital, delayed admission until active labor is associated with less time in the labor ward, fewer intrapartum oxytocics, less analgesia, and higher maternal satisfaction with birth experience.²⁵ Women in the labor assessment and delayed admission group report higher levels of control during labor. Cesarean delivery rates are similar, with a nonsignificant 30% decrease (RCT, 209 women).

In summary, admission to the hospital or birth center when the woman has regular painful contractions and the cervix is dilated > 3 cm is recommended, if feasible and safe (weak recommendation).

Comment

Our review of the best evidence regarding preparations before labor for women with a singleton gestation at term usually in vertex presentation identified several recommendations, most based on high-quality evidence. These recommendations include perineal massage with oil for 5–10 minutes daily starting at 34 weeks until labor; ≥ 1 daily sets of repeated voluntary contractions of the pelvic floor muscles that are performed at least several days of the week starting at approximately 30–32 weeks of gestation; education regarding self-diagnosis of active labor and labor in general in antenatal classes; no x-ray pelvimetry; sweeping of membranes weekly starting at 37–38 weeks of gestation; TVU CL at approximately 37–38 weeks of gestation, if prediction of spontaneous labor at term is desired; women with risk factors for abnormal outcome should plan to deliver in a hospital setting; low-risk women who contemplate planned home birth should be aware of the increase in perinatal morbidity and mortality rates; for low-risk women, alongside birth-center birth is associated with maternal benefits and higher satisfaction, compared with hospital birth; there is insufficient evidence to assess safety and effectiveness of freestanding birth-centers; midwife-led

care for low-risk women; continuous support by a professional such as doula, midwife, or nurse during labor; training of birth attendants in low- and middle-income countries; insufficient evidence to assess the effectiveness of team work training; and admission to the hospital or birth center when the woman has regular painful contractions and the cervix is dilated >3 cm, if feasible and safe (Table).

Our previous review published in the *American Journal of Obstetrics and Gynecology* is 12 years old (2008); therefore, it does not include the most recent evidence and, in fact, could not focus on interventions that have been evaluated by RCTs only in the last few years.²⁶ Other longer reviews on care before L&D do not include several of the latest level 1 data but are helpful to review the structural organization of L&D.²⁷

Strengths of our review include being based almost exclusively on RCTs and metaanalyses of RCTs (ie, level 1 evidence). Another strength is the conciseness and quick summary in a table format (Table). Limitations are related mostly to a lack of level 1 data regarding some interventions that are discussed, which makes the strength of some recommendation not strong and the quality of some evidence weak (Table).

In conclusion, in preparation for labor, there is high-quality evidence for providers to recommend perineal massage, voluntary contractions of the pelvic floor muscles, and sweeping of membranes. Women with a risk factor for abnormal outcome should plan to deliver in a hospital setting. Alongside birth center birth is associated with maternal benefits and higher satisfaction, compared with hospital birth. L&D for low-risk women who are treated by a midwife is beneficial, as is continuous support by a professional such as doula (Table). ■

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