Management of labor

Labor consists of a series of rhythmic, involuntary or medically induced contractions of the uterus that result in effacement (thinning and shortening) and dilation of the uterine cervix.
The stimulus for labor is unknown, but digitally manipulating or mechanically stretching the cervix during examination enhances uterine contractile activity, most likely by stimulating release of oxytocin by the posterior pituitary gland.

It specifically refers to the process which starts with uterine contractions which cause cervical changes which allow the fetus to be delivered vaginally, and ends with delivery of the placenta. Labor typically begins at some point when the fetus is considered full term—between 37 and 42 weeks' gestation.

In the third trimester, before labor starts, a woman might have a plug of mucus and blood fall out of the opening to the cervix, sometimes called a "bloody show". Other times the amniotic sac might rupture, sometimes called "water breaking". Either of these can trigger the onset of labor and so-called true labor contractions.

These guys have to be distinguished from the milder and ineffective false labor contractions, also called Braxton Hicks contractions (or sometimes called practice contractions).

Once they start, true labor contractions progress in frequency, duration, and intensity, and they can feel like waves that build up to a peak intensity and then gradually decrease.

Normal labor usually begins within 2 weeks (before or after) the estimated delivery date. In a first pregnancy, labor usually lasts 12 to 18 hours on average; subsequent labors are often shorter, averaging 6 to 8 hours.

- The active management of labor refers to active control, rather than passive observation, over the course of labor by the obstetrical provider.
- There are three essential elements to active management: Careful diagnosis of labor by strict criteria, Constant monitoring of labor with specific standards for normal progression, Prompt intervention (eg, amniotomy, high dose oxytocin) according to established guidelines if progress is unsatisfactory .
- It was introduced during the 1960's to shorten the length of labor in nulliparous women
- Active management of labor is generally limited to women who meet the following criteria: Nulliparous, Term pregnancy, Singleton infant in cephalic presentation, No pregnancy complications, Experiencing spontaneous onset of labor.

There are 3 stages of labor.

The **1st stage**—from onset of labor to full dilation of the cervix (about 10 cm)—has 2 phases, latent and active.
During the **latent phase**, irregular contractions become progressively coordinated, discomfort is minimal, and the cervix effaces and dilates to 4 cm.

The latent phase is difficult to time precisely, and duration varies, averaging 8 hours in nulliparas and 5 hours in multiparas; duration is considered abnormal if it lasts > 20 hours in nulliparas or > 12 hours in multiparas.
At first, there are irregular contractions that occur every 5 - 30 minutes and last about 30 seconds each, causing the cervix to dilate from 0 cm to about 3 cm and efface from about 0% - 30%.Then, regular contractions follow - they happen every 3 - 5 minutes and last about a minute or more, and this causes the cervix to dilate to 4 cm and efface to about 80%.

During the **active phase**, the cervix becomes fully dilated, and the presenting part descends well into the midpelvis.

Contractions are very intense, lasting between 60 to 90 seconds each, with only 30 seconds to 2 minutes of rest in between - so sometimes they even overlap a bit, with one contraction beginning before the previous one is done. Also, the amniotic sac often ruptures at this point if it hasn't already.

On average, the active phase lasts 5 to 7 hours in nulliparas and 2 to 4 hours in multiparas.
Traditionally, the cervix was expected to dilate about 1.2 cm/hour in nulliparas and 1.5 cm/hour in multiparas.
However, recent data suggest that slower progression of cervical dilation from 4 to 6 cm may be normal.
Within an hour after presentation at a hospital, whether a woman is in labor can usually be determined based on the following:

- Occurrence of regular and sustained painful uterine contractions
- Bloody show
- Membrane rupture
- Complete cervical effacement

If these criteria are not met, false labor may be tentatively diagnosed, and the pregnant woman is typically observed for a time and, if labor does not begin within several hours, is sent home.

When pregnant women are admitted, their blood pressure, heart and respiratory rates, temperature, and weight are recorded, and presence or absence of edema is noted.

A urine specimen is collected for protein and glucose analysis, and blood is drawn for a complete blood count (CBC), blood typing, and antibody screening.

If routine laboratory tests were not done during prenatal visits, they should be done; these tests include screening for HIV, hepatitis B, syphilis, and group B streptococcal infection.

A physical examination is done. While examining the abdomen, the clinician estimates size, position, and presentation of the fetus, using the Leopold maneuver.

- **Abdominal examination begins with inspection, and the Leopold maneuvers described below. The initial maneuver involves the examiner placing both of his or her hands on each upper quadrant of the patient's abdomen and gently palpating the fundus with the tips of the fingers to define which**

fetal pole is present in the fundus. If it is the fetus' head, it should feel hard and round. In a breech presentation, a large, nodular body is felt

- **The second maneuver involves palpation in the paraumbilical regions with both hands by applying gentle but deep pressure. The purpose is to differentiate the fetal spine (a hard, resistant structure) from its limbs (irregular, mobile small parts) to determinate the fetal' position.**
- **This maneuver also allows for an assessment of the fetal weight and of the volume of amniotic fluid.**
- **The third maneuver is suprapubic palpation by using the thumb and fingers of the dominant hand.**
- **As with the first maneuver, the examiner ascertains the fetal presentation and estimates its station. If the presenting part is not engaged, a movable body (usually the fetal occiput) can be felt.**
- **The fourth maneuver involves palpation of bilateral lower quadrants with the aim of determining if the presenting part of the fetus is engaged in the mother's pelvis. The examiner stands facing the mother's feet with the tips of the first 3 fingers of both hands, the examiner exerts deep pressure in the direction of the axis of the pelvic inlet. In a cephalic presentation, the fetal head is considered engaged if the examiner's hands diverge as they trace the fetus' head into the pelvis.**

The clinician notes the presence and rate of fetal heart sounds, as well as location for auscultation.
Preliminary estimates of the strength, frequency, and duration of contractions are also recorded.
A helpful mnemonic device for evaluation is the 3 Ps:

- Powers (contraction strength, frequency, and duration)
- Passage (pelvic measurements)
- Passenger (eg, fetal size, position, heart rate pattern)

If labor is active and the pregnancy is at term, a clinician examines the vagina with 2 fingers of a gloved hand to evaluate progress of labor.

If bleeding (particularly if heavy) is present, the examination is delayed until placental location is confirmed by ultrasonography.

If bleeding results from placenta previa, vaginal examination can initiate severe hemorrhage.

If labor is not active but membranes are ruptured, a speculum examination is done initially to document cervical dilation and effacement and to estimate station (location of the presenting part); however, digital examinations are delayed until the active phase of labor or problems (eg, decreased fetal heart sounds) occur.
If the membranes have ruptured, any fetal meconium (producing greenish-brown discoloration) should be noted because it may be a sign of fetal stress. If labor is preterm (< 37 weeks) or has not begun, only a sterile speculum examination should be done, and a culture should be taken for gonococci, chlamydiae, and group B streptococci.

Cervical dilation is recorded in centimeters as the diameter of a circle; 10 cm is considered complete.
Effacement is estimated in percentages, from zero to 100%. Because effacement involves cervical shortening as well as thinning, it may be recorded in centimeters using the normal, uneffaced average cervical length of 3.5 to 4.0 cm as a guide.
Station is expressed in centimeters above or below the level of the maternal ischial spines. Level with the ischial spines corresponds to 0 station; levels above (-) or below (+) the spines are recorded in cm increments.

Fetal lie, position, and presentation are noted.

- **Lie** describes the relationship of the long axis of the fetus to that of the mother (longitudinal, oblique, transverse).
- **Position** describes the relationship of the presenting part to the maternal pelvis (eg, occiput left anterior [OLA] for cephalic, sacrum right posterior [SRP] for breech).
- **Presentation** describes the part of the fetus at the cervical opening (eg, breech, vertex, shoulder).

Preparation for delivery

Women are admitted to the labor suite for frequent observation until delivery. If labor is active, they should receive little or nothing by mouth to prevent possible vomiting and aspiration during delivery or in case emergency delivery with general anesthesia is necessary.

Shaving or clipping of vulvar and pubic hair is not indicated, and it increases the risk of wound infections.

An IV infusion of Ringer's lactate may be started, preferably using a large-bore indwelling catheter inserted into a vein in the hand or forearm.

During a normal labor of 6 to 10 hours, women should be given 500 to 1000 mL of this solution.

The infusion prevents dehydration during labor and subsequent hemoconcentration and maintains an adequate circulating blood volume. The catheter also provides immediate access for drugs or blood if needed. Fluid preloading is valuable if epidural or spinal anesthesia is planned.

If instrumental or cesarean delivery seems unlikely, women may drink clear liquids.

Analgesia

Analgesics may be given during labor as needed, but only the minimum amount required for maternal comfort should be given because analgesics cross the placenta and may depress the neonate’s breathing.

Neonatal toxicity can occur because after the umbilical cord is cut, the neonate, whose metabolic and excretory processes are immature, clears the transferred drug much more slowly by liver metabolism or by urinary excretion.

Preparation for and education about childbirth lessen anxiety.

Physicians are increasingly offering epidural injection (providing regional anesthesia) as the first choice for analgesia during labor.

Typically, a local anesthetic (eg, 0.2% ropivacaine, 0.125% bupivacaine) is continuously infused, often with an opioid (eg, fentanyl, sufentanil), into the lumbar epidural space.

Initially, the anesthetic is given cautiously to avoid masking the awareness of pressure that helps stimulate pushing and to avoid motor block.

Women should be reassured that epidural analgesia does not increase the risk of cesarean delivery .

If epidural injection is inadequate or if IV administration is preferred, fentanyl (100 mcg) or morphine sulfate (up to 10 mg) given IV every 60 to 90 minutes is commonly used.

These opioids provide good analgesia with only a small total dose.

If neonatal toxicity results, respiration is supported, and naloxone 0.01 mg/kg can be given IM, IV, subcutaneously, or endotracheally to the neonate as a specific antagonist.

Naloxone may be repeated in 1 to 2 minutes as needed based on the neonate's response.

Clinicians should check the neonate 1 to 2 hours after the initial dosing with naloxone because the effects of the earlier dose abate.

If fentanyl or morphine provides insufficient analgesia, an additional dose of the opioid or another analgesic method should be used rather than the so-called synergistic drugs (eg, promethazine), which have no antidote. (These drugs are actually additive, not synergistic.) Synergistic drugs are still sometimes used because they lessen nausea due to the opioid; doses should be small.

Fetal status must be monitored during labor.

The main parameters are baseline fetal heart rate (HR) and fetal HR variability, particularly how they change in response to uterine contractions and fetal movement.

Monitoring can be manual and intermittent, using a fetoscope for auscultation of fetal HR.

However, electronic fetal HR monitoring (external or internal) has become standard of care for high-risk pregnancies, and many clinicians use it for all pregnancies. The value of routine use of electronic monitoring in low-risk deliveries is often debated. Electronic fetal monitoring has not been shown to reduce overall mortality rates in large clinical trials and has been shown to increase rate of cesarean delivery, probably because many apparent abnormalities are false positives.

Thus, the rate of cesarean delivery is higher among women monitored electronically than among those monitored by auscultation.

Fetal pulse oximetry has been studied as a way to confirm abnormal or equivocal results of electronic monitoring; status of fetal oxygenation may help determine whether cesarean delivery is needed.

Fetal ST-segment and T-wave analysis in labor (STAN) can be used to check the fetal ECG for ST-segment elevation or depression; either finding presumably indicates fetal hypoxemia and has a high sensitivity and specificity for fetal acidosis. For STAN, an electrode must be attached to the fetal scalp; then changes in the T wave and ST segment of the fetal ECG are automatically identified and analyzed.

If manual auscultation of fetal HR is used, it must be done throughout labor according to specific guidelines, and one-on-one nursing care is needed.

- For low-risk pregnancies with normal labor, fetal HR must be checked after each contraction or at least every 30 minutes during the 1st stage of labor and every 15 minutes during the 2nd stage.
- For high-risk pregnancies, fetal HR must be checked every 15 minutes during the 1st stage and every 3 to 5 minutes during the 2nd stage.

Listening for at least 1 to 2 minutes beginning at a contraction's peak is recommended to check for late deceleration.

Periodic auscultation has a lower false-positive rate for abnormalities and incidence of intervention than continuous electronic monitoring, and it provides opportunities for more personal contact with women during labor.

However, following the standard guidelines for auscultation is often difficult and may not be cost-effective. Also, unless done accurately, auscultation may not detect abnormalities.

Electronic fetal HR monitoring may be

- **External:** Devices are applied to the maternal abdomen to record fetal heart sounds and uterine contractions.
- **Internal:** Amniotic membranes must be ruptured. Then, leads are inserted through the cervix; an electrode is attached to the fetal scalp to monitor HR, and a catheter is placed in the uterine cavity to measure intrauterine pressure.

Usually, external and internal monitoring are similarly reliable. External devices are used for women in normal labor; internal methods are used when external monitoring does not supply enough information about fetal well-being or uterine contraction intensity (eg, if the external device is not functioning correctly).

Pelvic examinations are done every 2 to 3 hours to evaluate labor progress.

Lack of progress in dilation and descent of the presenting part may indicate dystocia (fetopelvic disproportion).
Standing and walking shorten the first stage of labor by > 1 hour and reduce the rate of cesarean delivery . If the membranes have not spontaneously ruptured, some clinicians use amniotomy (artificial rupture of membranes) routinely during the active phase.

As a result, labor may progress more rapidly, and meconium-stained amniotic fluid may be detected earlier.

Amniotomy during this stage may be necessary for specific indications, such as facilitating internal fetal monitoring to confirm fetal well-being.

Amniotomy should be avoided in women with HIV infection or hepatitis B or C, so that the fetus is not exposed to these organisms.

- **The appearance of meconium staining of the amniotic fluid is important it could be due to maturity or fetal compromise.**
- **The appearance of meconium is an indication for electronic fetal monitoring, and the possibility that the fetus may develops meconium aspiration intrapartum or after delivery with the onset of breathing.**

During the 1st stage of labor, maternal heart rate and blood pressure and fetal heart rate should be checked continuously by electronic monitoring or intermittently by auscultation, usually with a portable Doppler ultrasound device.
Women may begin to feel the urge to bear down as the presenting part descends into the pelvis.
However, they should be discouraged from bearing down until the cervix is fully dilated so that they do not tear the cervix or waste energy.

The **2nd stage** is the time from full cervical dilation to delivery of the fetus.
On average, it lasts 2 hours in nulliparas (median 50 minutes) and 1 hour in multiparas (median 20 minutes).
It may last another hour or more if conduction (epidural) analgesia or intense opioid sedation is used.
For spontaneous delivery, women must supplement uterine contractions by expulsively bearing down.
In the 2nd stage, women should be attended constantly, and fetal heart sounds should be checked continuously or after every contraction.
Contractions may be monitored by palpation or electronically.
During the 2nd stage of labor, perineal massage with lubricants and warm compresses may soften and stretch the perineum and thus reduce the rate of 3rd- and 4th-degree perineal tears.
These techniques are widely used by midwives and birth attendants. Precautions should be taken to reduce risk of infection with perineal massage.
During the 2nd stage (in contrast to the 1st stage), the mother's position does not affect duration or mode of delivery or maternal or neonatal outcome in deliveries without epidural anesthesia.
Also, the pushing technique (spontaneous versus directed and delayed versus immediate) does not affect the mode of delivery or maternal or neonatal outcome.
Use of epidural anesthesia delays pushing and may lengthen the 2nd stage by an hour .
Now that the cervix is fully dilated, we enter the second stage of labor can be thought of as the pushing stage. During this stage, the critical thing is for the baby, and in particular the baby's head, to navigate through the maternal pelvis, and this depends on the "3 Ps" - power, passenger, and passage. Power refers to forceful uterine contractions, passenger refers to the fetus, and passage refers to the route that the fetus has to travel through the bony pelvis.

In fact, the relationship between the baby's head and the bony pelvis is so critical, that human babies have evolved with unfused skulls, just so their head can be as large as possible and still successfully and safely make that passage through the pelvis into the world.

Now there are a few factors that determine how easy this passage is for the fetus. First is fetal size, the critical factor is the size of the fetal head.

Also though there's fetal attitude, which refers to the way that the fetal body is flexed.

When labor starts, the fetus is normally fully flexed, which means the chin is on the chest, and they have a rounded back with flexed arms and legs. In this position, the smallest diameter (which is referred to as the suboccipitobregmatic diameter) presents at the pelvic inlet.

Larger fetuses and those that aren't completely flexed have more difficulty making it through the passage.
Next there's fetal lie, which describes how the fetus is positioned in the uterus.

A longitudinal fetal lie is ideal, where the long axis of the fetus, which is its spine, lies along the maternal long axis—the mom's spine. The fetus can also be transverse though, where the fetal spine is perpendicular to mom's spine, or it can be oblique, where it's slightly at an angle, and these two positions can impede the progression of labor.

Finally, there's fetal presentation which refers to the first fetal part, called the presenting part, to descend into the pelvic inlet. Cephalic, or head-first, is the first type, and furthermore the most common and optimal presentation for easy delivery is a type of cephalic presentation called vertex, which includes complete flexion of the head as well. Also though, there's breech presentation (which is head up, so the bottom, feet, or knees present first), as well as shoulder (where the shoulders present first).

To make it through the passage, the fetus makes several positional changes which are called cardinal movements or mechanisms of labor.

Initially there is descent, which is the downward movement of the fetus to the pelvic inlet. The degree of descent is called the fetal station, which is described in terms of the relationship of the presenting part to mom's ischial spines.

The fetus moves from the pelvic inlet (which is about minus 5 station) down to the ischial spines (which is station 0), and this position's called engagement.

Then there's flexion, where the fetal chin presses against its chest as its head meets resistance from the pelvic floor.

Next there's internal rotation, where the fetal shoulders internally rotate by 45 degrees so the widest part of the shoulders are in line with the widest part of the pelvic inlet.

After the fetal head passes under the symphysis pubis (which is at about +4 station), there's extension, which is where the fetal head will change from flexion to extension, and then they move to about +5 station and emerge from the vagina.

After the delivery of the head, there's restitution, where the head externally rotates so that the shoulders can pass through the pelvic outlet and under the symphysis pubis.

And finally there's expulsion, where the anterior shoulder slips under the symphysis pubis, followed by the posterior shoulder, and then finally followed by the rest of the body. This marks the end of the second stage of labor.

- **Descent and delivery of the head: it is judged by watching the perineum, when the head no longer recedes between contractions (crowning), this indicates that the head has passed through the pelvic floor and delivery is imminent.**
- **The midwife must control head delivery to prevent sudden birth, so with crowning the patient should take rapid shallow breaths, carefully deliver the head by applying pressure through the perineum onto the forehead. Episiotomy is sometimes needed to prevent perineal tear it is done with crowning.**

Delivery of the shoulders and rest of the body: after the birth of the fetal head check the cord round the neck if it is tight around the neck so clamping is indicated, if there is meconium nasopharyngeal suction is mandatory to prevent aspiration.

External rotation occur we apply gentle pull on the head downwards and forwards until the anterior shoulder appears, the head is now lifted until the posterior shoulder appears then deliver the body and legs.

Immediate care to the neonate

After delivery the fetus takes its first breath within seconds. No need for immediate clamping because about 80 ml of blood will go to the baby from the placenta before cord pulsation cease. Keep the head in dependent position to allow the drainage of secretions.

After clamping the cord, I minute Apgar score assessed then place the fetus on the mother's abdomen. Give vitamin K and do general examination for the baby for any abnormality and a wrist label attached for identification.

Apgar score: is the clinical evaluation of the newborn it is usually recoded at I and 5 minu

Sign	**0**	**1**	**2**
Heart rate	**Absent**	**Below 100 beat**	**Over 100 beat**
Respiratory effort	**Absent**	**Weak**	**Good strong cry**
Muscle tone	**Limp**	**Some flexion**	**Active motion, well flexed extremities**
Reflex irritability	**No response**	**Grimace**	**Cry**
Color	**Blue, pale**	**Body pink; extremities blue**	**Completely pink**

The **3rd stage** of labor begins after delivery of the baby and ends with delivery of the placenta. This stage usually lasts only a few minutes but may last up to 30 minutes.

- **placental extrusion.**
- The retroplacental hematoma either follows the placenta or is found within the inverted sac. In this process, known as the *Schultze mechanism* of placental expulsion, blood from the placental site pours into the inverted sac, not escaping externally until after extrusion of the placenta. In the other method of placental extrusion, known as the *Duncan mechanism*, separation of the placenta occurs first at the periphery, with the result that blood collects between the membranes and the uterine wall and escapes from the vagina.
- **It takes 5-10 minutes normally. If longer than 30 minutes it is prolonged.**
- **Separation of placenta occurs due to reduction of uterine volume due to contraction and retraction.**

- **Cleavage plane develops and the placenta lies in the lower segment of the uterus.**
- **Signs of separation are: lengthening of the cord.**
- **Gush of blood**
- **Rising of the uterine fundus, it becomes hard and globular.**
- ***Traditionally; we wait for signs of separation of the placenta then expel it by pressing down on the fundus. This takes 20 minutes and is associated with 5% PPH.**
- ***The modern management of the 3rd stage of labor is active management and involves a procedure called controlled cord traction.**
- **This technique is as follows:**
- **1-Synthetic oxytocin 10 IU or syntometrine (5 IU oxytocin, 0.5 mg ergometrine) is given by Im injection following delivery of the anterior shoulder. Syntometrine gives a more sustained contraction but must not be used with hypertension.**
- **2-after delivery the attendant should place the left hand on the uterus to identify contraction. During this time observe any bleeding, clamp the cord after 1-2 minutes after delivery of the baby, and identify lengthening of the cord.**

3-when contraction is felt the left hand should be put suprapubically to elevate the fundus with the palm facing the mother, at the same time the right hand grasping the cord and exert traction steadily to deliver the placenta gently. In 2% of cases the placenta will not be expelled, if no bleeding further attempt is tried after 10 minutes. If this fails we need evacuation in the theater.

After completion inspect the placental cotyledons and examine the vulva for tears or lacerations.

Sometimes the several-hours after delivery is called the "fourth stage", because there are major physiologic changes like adaptation to the blood loss, and the start of uterine involution, where the uterus begins returning to its pre-pregnant state.