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# Pre Term Birth



### Definitions for preterm birth

Gestational age criteria	
World Health Organization	
Moderate to late preterm	32 to <37 weeks
Very preterm	28 to <32 weeks
Extremely preterm	<28 weeks
Centers for Disease Control and Prevention	
Preterm	<37 weeks
Late preterm	34 to 36 weeks
Early preterm	<34 weeks
Birth weight criteria	
Low birth weight (LBW)	<2500 grams
Very low birth weight (VLBW)	<1500 grams
Extremely low birth weight (ELBW)	<1000 grams



Preterm birth (PTB) refers to a delivery that occurs between 20 and 37 weeks of gestation



Seventy to 80 percent of PTBs are spontaneous: due to **preterm labor (40 to 50 percent)** or preterm prelabor rupture of membranes (20 to 30 percent); rarely, cervical insufficiency results in spontaneous PTB (sPTB). The remaining 20 to 30 percent of PTBs are iatrogenic: due to maternal or fetal issues that jeopardize the health of the mother or fetus (preeclampsia, placenta previa, abruptio placentae, fetal growth restriction, multiple gestation). Complications of pregnancy can lead to both sPTB and provider-initiated PTBs



Ideally, identification of modifiable and nonmodifiable risk factors for PTB **before conception** or early in pregnancy will lead to interventions that help prevent this complication



# PATHOGENESIS OF PRETERM LABOR

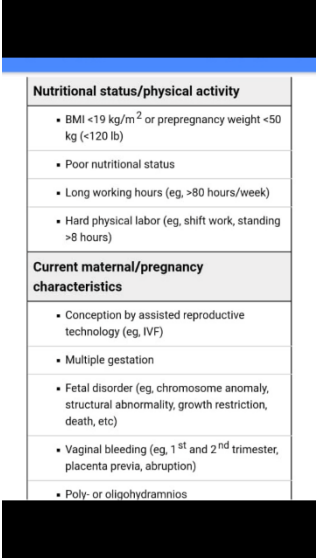


### Risk factors for preterm birth

#### Risk factors for preterm birth

Prior OB/GYN history
▪ Prior PTB
▪ Prior cervical surgery (eg, cone biopsy, LEEP)
▪ Multiple D&Es
▪ Uterine anomalies
Maternal demographics
▪ <17 or >35 years of age
▪ Lower educational level (eg, <12 grades)
▪ Single marital status
▪ Lower socioeconomic status
▪ Short interpregnancy interval (eg, <6 months)







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|--|
| <ul style="list-style-type: none"><li>▪ Substance use:<ul style="list-style-type: none"><li>▪ Smoking (eg, tobacco)</li><li>▪ Heavy alcohol consumption</li><li>▪ Cocaine</li><li>▪ Heroin</li></ul></li></ul>   |
| <ul style="list-style-type: none"><li>▪ Infection:<ul style="list-style-type: none"><li>▪ Bacterial vaginosis</li><li>▪ Trichomoniasis</li><li>▪ Chlamydia</li><li>▪ Gonorrhea</li><li>▪ Syphilis</li><li>▪ Urinary tract (eg, asymptomatic bacteriuria, pyelonephritis)</li><li>▪ Severe viral infection</li><li>▪ Intrauterine infection</li></ul></li></ul> |
| <ul style="list-style-type: none"><li>▪ Short cervical length between 14 and 28 weeks</li></ul>  |
| <ul style="list-style-type: none"><li>▪ Positive fFN between 22 and 34 weeks</li></ul>   |
| <ul style="list-style-type: none"><li>▪ Uterine contractions</li></ul>   |



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OB/GYN: obstetrics and gynecology; PTB: preterm birth; LEEP: loop electrosurgical excision procedure; D&E: dilation and evacuation; BMI: body mass index; IVF: in vitro fertilization; fFN: fetal fibronectin.

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The pathophysiology of preterm labor involves at least **four** primary pathogenic processes that result in a final common pathway ending in spontaneous preterm labor and delivery:



- Premature activation of the maternal or fetal hypothalamic-pituitary-adrenal axis
- Inflammation and infection
- Decidual hemorrhage
- Pathological uterine distention



## CLINICAL FINDINGS



- The clinical findings that define true labor ( **regular contractions plus cervical change**) are the same whether labor occurs preterm or at term. The following prodromal signs and symptoms may be present for several hours before diagnostic criteria for labor are met:



- ● Menstrual-like cramping
- ● Mild, irregular contractions
- ● Low back ache
- ● Pressure sensation in the vagina or pelvis
- ● Vaginal discharge of mucus, which may be clear, pink, or slightly bloody ( mucus plug, bloody show)
- ● Spotting, light bleeding



- Uterine contractions are the sine qua non of labor, but mild irregular contractions are a normal finding at **all stages of pregnancy**, thereby adding to the challenge of distinguishing true labor



- True labor is more likely when an increasing frequency of contractions is accompanied by increasing intensity and duration of the contractions since an increase in the frequency alone may occur transiently, especially at night and with increasing gestational age.



Cervical changes on physical examination that precede or accompany true labor include **dilation, effacement, softening, and movement** to a more anterior position. The rate of cervical change distinguishes cervical ripening, which occurs over days to weeks, from true labor, in which cervical change occurs over minutes to hours.



# COMPONENTS OF THE DIAGNOSTIC EVALUATION



## Our initial evaluation of women with suspected preterm labor includes:

- Review of the patient's past and present obstetric and medical history, including risk factors for preterm birth



Preterm labor may be triggered by an underlying obstetric complication (abruption) or medical/surgical disorder ( appendicitis, bowel obstruction or strangulation, pyelonephritis, acute cholecystitis, pneumonia ) that requires specific intervention. These cases may present with additional symptoms and/or symptoms atypical for preterm labor. Sometimes, this requires a high index of suspicion since laboring women have abdominal pain and may have back pain, nausea, vomiting, or diarrhea.



## Maternal vital signs

temperature, blood pressure, heart rate, respiratory rate.



- Review of the fetal heart rate pattern



Examination of the uterus to assess firmness, tenderness, fetal size, and fetal position.



- Assessment of gestational age, **based on the best estimate from the first ultrasound examination** . If prior ultrasound estimation of gestational age is not available, an ultrasound examination for fetal biometry to assist in estimation of gestational age should be performed



# Speculum examination



- We perform a speculum examination using a **wet non-lubricated** speculum (lubricants may interfere with tests performed on vaginal specimens). The goals of this examination are to:



- ● Assess the presence and amount of **uterine bleeding**. ● Estimate cervical dilation. **Cervical dilation  $\geq 3$  cm** supports the diagnosis of preterm labor.
- Bleeding from abruptio placentae or placenta previa can trigger preterm labor.



Assessment of **contraction** frequency, duration,  
and intensity.



- Use a swab to obtain a cervicovaginal fluid specimen in case fetal fibronectin (fFN) testing is desired after transabdominal ultrasound examination. The swab is rotated in the posterior fornix for 10 seconds.



Evaluate fetal membrane status (intact or ruptured) by standard methods. **Preterm prelabor rupture of membranes (PPROM)** often precedes or occurs during preterm labor. Diagnosis and management of PPRM are reviewed separately.



# Digital cervical examination



- In most patients, cervical dilation and effacement are assessed by digital examination after placenta previa and rupture of membranes have been excluded by history and physical, laboratory, and ultrasound examinations, as appropriate.



cervical dilation  $>3$  cm in the presence of uterine contractions at 20+0 to 36+6 weeks supports the diagnosis of preterm labor; inhibition of acute preterm labor is less likely to be successful as the cervix dilates beyond 3 cm.



# Society for Maternal-Fetal Medicine (SMFM)



SMFM recommends routine transvaginal ultrasound (TVUS) cervical length screening between 16 and 24 weeks of gestation for women with a singleton pregnancy and history of prior spontaneous preterm birth



## Transvaginal ultrasound examination



TVUS measurement of cervical length is useful for supporting or excluding the diagnosis of preterm labor when the diagnosis is unclear. A short cervix before 34 weeks of gestation ( $<30$  mm) is predictive of an increased risk for preterm birth in all populations, while a long cervix ( $\geq 30$  mm) has a high negative predictive value for preterm birth. Knowledge of cervical length in women with threatened preterm labor may improve outcome, particularly avoidance of unnecessary hospitalization and interventions when the cervix is long, but data are limited



# American College of Obstetricians and Gynecologists (ACOG)



In a practice bulletin on preterm birth, ACOG neither mandated universal routine cervical length screening in women without a prior spontaneous preterm birth nor recommended against such screening . However, in women undergoing obstetric ultrasound examination, ACOG has recommended examining the cervix when technically feasible



## International Federation of Gynecology and Obstetrics (FIGO)



FIGO recommends sonographic cervical length screening in all women 19+0 to 23+6 weeks of gestation using TVUS



# Laboratory evaluation

Overview — We order the following laboratory tests:



- Rectovaginal group B streptococcal culture, if not done within the previous five weeks; antibiotic prophylaxis depends on the results.



**Urine culture** since asymptomatic bacteriuria is associated with an increased risk of preterm labor and birth.



Drug testing in patients with risk factors for substance abuse, given the link between cocaine and methamphetamine use and placental abruption



Fetal fibronectin for selected patients



- fFN is an **extracellular matrix protein** present at the decidual-chorionic interface. Disruption of this interface due to subclinical infection or inflammation, abruption, or uterine contractions releases fFN into cervicovaginal secretions, which is the basis for its use as a marker for predicting spontaneous preterm birth .
- Measurement of fFN is performed to distinguish women in true preterm labor from those with false labor.



- Testing for sexually transmitted infections ( chlamydia, gonorrhea) depends on the patient's risk factors for these infections and, if indicated, whether antepartum testing was recently performed.



- fFN in women <34 weeks of gestation with cervical dilation <3 cm and cervical length 20 to 30 mm on TVUS examination.



## Other laboratory tests

Like fFN, **placental alpha-microglobulin-1 (PAMG-1)** or **phosphorylated insulin-like growth factor binding protein-1 (pIGFBP-1)** in vaginal or cervical secretions suggests disruption of the fetal membranes.



Theoretically, accurate identification of women in true preterm labor provides an opportunity for interventions that can improve neonatal outcome (antenatal corticosteroid therapy, group B streptococcal infection prophylaxis, magnesium sulfate for neuroprotection, transfer to a facility with an appropriate level nursery, if necessary). It should also avoid unnecessary and sometimes costly intervention for the approximately 50 percent of patients who will subsequently deliver at term



# DIAGNOSIS



- We make the diagnosis of preterm labor based upon clinical criteria of **regular painful uterine contractions accompanied by cervical change** (dilation and/or effacement). Vaginal bleeding and/or ruptured membranes in this setting increase diagnostic certainty . Because the clinical findings of early labor are poorly predictive of the diagnosis, over-diagnosis is common until labor is well established.



We use the following specific criteria:



- Uterine contractions ( $\geq 4$  every 20 minutes or  $\geq 8$  in 60 minutes) plus
- Cervical dilation  $\geq 3$  cm or
- Cervical length  $< 20$  mm on transvaginal ultrasound or
- Cervical length 20 to  $< 30$  mm on transvaginal ultrasound and positive fetal fibronectin



The contraction criteria are those used for selecting subjects in research settings. Before the use of ultrasound for measuring cervical length, research studies also required documented cervical change or **cervical effacement  $\geq 80$  percent or cervical dilation  $> 2$  cm**. These criteria were chosen because women who did not meet them were often ultimately diagnosed with false labor and went on to have a late preterm or term delivery



**≥34 weeks of gestation :**



- Women in preterm labor **at  $\geq 34$  weeks** are admitted for delivery. After an observation period **of four to six hours**, women without progressive cervical dilation and effacement are **discharged to home**, as long as fetal well-being is confirmed ( reactive nonstress test) and obstetric complications associated with preterm labor, such as abruptio placentae, chorioamnionitis, and preterm rupture of membranes, have been excluded. We arrange follow-up in one to two weeks and give the patient instructions to call if she experiences additional signs or symptoms of preterm labor, or has other pregnancy concerns



- The **34th week of gestation** is the threshold at which perinatal morbidity and mortality are too low to justify the potential maternal and fetal complications and costs associated with inhibition of preterm labor, which only results in short term delay in delivery



<34 weeks of gestation



In women <34 weeks with uterine contractions, cervical dilation  $\geq 3$  cm supports the diagnosis of preterm labor. We initiate treatment of preterm labor in these women to reduce the morbidity and mortality of preterm birth. Further diagnostic evaluation with sonographic measurement of cervical length or laboratory assessment of fetal fibronectin (fFN) is not performed because these tests do not enhance diagnostic accuracy in this setting



- The diagnosis of preterm labor is less clear in women with contractions, cervical dilation  $<3$  cm, and intact membranes. Our approach to diagnosis and treatment in these cases is shown in the algorithm and discussed below (algorithm 1). The use of cervical length measurement, with fFN in selected cases, is based upon clinical experience and accumulating data on risk of preterm birth according to cervical length on transvaginal



Cervical length 20 to <30 mm :



Symptomatic women with **cervical dilation <3 cm and cervical length 20 to <30 mm** are at increased risk of preterm birth compared with women with longer cervical lengths, but most of these women do not deliver preterm. Therefore, for this subgroup of women, we send a cervicovaginal sample for fFN testing



- Use of sonographic cervical length and fFN determinations to differentiate true labor from false labor in preterm symptomatic women are supported by the American College of Obstetricians and Gynecologists and Society for Maternal-Fetal Medicine , although high quality evidence of efficacy is not available.



Cervical length  $\geq 30$  mm



- Approximately 50 percent of women with symptoms of preterm labor have a transvaginal ultrasound **cervical length  $\geq 30$  mm** . Symptomatic women with cervical length  $\geq 30$  mm are at low risk (<5 percent) of delivery within seven days, regardless of fFN result; the addition of fFN testing does not significantly improve the predictive value of cervical length measurement alone .



- After an observation period of four to six hours, women without progressive cervical dilation and effacement are discharged to home, as long as fetal well-being is confirmed ( reactive nonstress test) and obstetric complications associated with preterm labor, such as abruptio placenta, chorioamnionitis, and preterm rupture of membranes, have been excluded. We arrange follow-up in one to two weeks and give the patient instructions to call if she experiences additional signs or symptoms of



## APPROACH TO TRIAGE:



# TWIN PREGNANCIES

- The prediction of preterm birth based on cervical length measurement is somewhat different for twin pregnancies, which necessitates some changes in triage criteria. The optimal cervical length threshold appears to be higher due to the higher baseline risk for preterm birth in twins compared with singletons; however, less data are available for establishing appropriate thresholds



≥34 weeks of gestation

- Triage is the same as for singletons.



## <34 weeks of gestation

- For women with twin pregnancies <34 weeks with uterine contractions, cervical dilation  $\geq 3$  cm supports the diagnosis of preterm labor; further diagnostic evaluation with sonographic measurement of cervical length or laboratory assessment of fetal fibronectin (fFN) does not enhance diagnostic accuracy. Treatment of preterm labor is initiated.



- The diagnosis of preterm labor is less clear in women with contractions, cervical dilation  $<3$  cm, and intact membranes, so a transvaginal ultrasound measurement of cervical length is obtained.



- Women with cervical length  $>35$  mm and no cervical change on digital examination after a four- to six-hour period of observation are at low risk for preterm delivery, and can be discharged home, as long as fetal well-being is confirmed, maternal status is stable, and there are no additional maternal concerns.



- Women with cervical length  $<25$  mm are at high risk of preterm delivery; therefore, we begin interventions to reduce morbidity associated with preterm birth.



- Women with cervical length 25 to 35 mm on transvaginal ultrasound examination undergo fFN testing. If the test is positive, we begin interventions to reduce morbidity associated with preterm birth



- If the test is negative, we discharge the patient after a 6- to 12-hour period of observation.



- Interventions to reduce the risk for recurrent indicated PTB depend on the indication for PTB. For example, administration of low-dose aspirin to women with a history of early delivery because of preeclampsia with severe features can reduce their risk for recurrent preeclampsia and PTB



- Although **surgical uterine evacuation** appeared to be a risk factor for subsequent PTB, observational studies are flawed because they are subject to recall bias and inadequate adjustment of many of the other risk factors for adverse pregnancy outcome



- PTBs are more prevalent in some family pedigrees and racial groups, in women who were born preterm themselves, and in women with a first-degree female relative who had a PTB



# Intervention



- Women undergoing treatment of cervical intraepithelial neoplasia should have the procedure that best diagnoses or prevents cervical cancer and also incurs the lowest risk of reproductive effects



- Although women who have undergone cervical surgery may develop cervical insufficiency, the pregnancy course and outcome need to be evaluated before making this diagnosis. We perform a single transvaginal ultrasound measurement of cervical length measurement at 18 to 24 weeks in all women and treat those with a short cervix ( $\leq 25$  mm) and no prior PTB



- — The rate of PTB is higher at the extremes of maternal age . Physiologic immaturity and socioeconomic factors may increase risk for adolescent mothers; a higher prevalence of preexisting chronic disease and obesity may increase risk for older mothers



## Intervention



Myomectomy before pregnancy may be indicated in women with pregnancy loss or early PTB. Every effort should be made to avoid surgical removal of fibroids during pregnancy because of the risk for significant morbidity



# Congenital

— In women with congenital uterine malformations, the magnitude of risk for PTB depends upon the specific abnormality



# Acquired

- Women with fibroids may be at slightly increased risk for pregnancy loss and PTB. A large fibroid ( $\geq 5$  to 6 cm) or multiple fibroids appear to be the most important risk factors for PTB; a submucosal location is the most important risk factor for pregnancy loss



- Surgical correction of the abnormality may **reduce** the risk for PTB.



- Preconception identification and optimization of chronic medical diseases, such as **diabetes and hypertension**, can improve maternal health and pregnancy outcome



The End

Thanks For Your Attention