Preterm Labor and Premature Rupture of Membranes

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Objectives
- Describe the pathophysiology and the nursing management of patients with Preterm Labor
- Describe the nursing implications for use of the following drugs: Terbutaline, MgSO4, Nifedipine, Indocin, Ibuprofen and Glucocorticoids
- Describe the nursing management of patients with preterm premature rupture of membranes
- Describe the nursing care of the patient on bed rest.
- Describe the common emotional themes of the patient on bed rest.

Incidence
- Leading cause of neonatal mortality
- Most common reason for antenatal hospitalization
- 12% of all live births occur before term and PTL preceded 50% of these preterm births.

Morbidity and Mortality in USA
- 70% of all neonatal deaths
- 36% of infant deaths
- 25-50% cases of long-term neurologic impairment.

Healthcare Costs in USA
- $26.2 billion or more annually (2007) - March of Dimes Statistic
- $51,000 per premature infant

PTL Treatment Goal
Prolong the pregnancy long enough to decrease the incidence of neonatal mortality and morbidity associated with prematurity, while minimizing maternal and fetal risks.
Definition

- **Preterm labor:**
  - Regular uterine contractions accompanied by change in cervical dilation, effacement or both
  - Initial presentation with regular contractions and cervical dilation of at least 2 cm.
- **Preterm birth:** between 20 - 36 6/7 wks
  - Less than 10% of women with clinical diagnosis of PTL actually give birth within 7 days.


Preterm birth vs Low birth weight

- **Preterm birth**
  - Gestational age
    - < 37 weeks
- **Low birth weight**
  - Birth weight
  - At or ≤ 2,500 g

Pathogenesis of PTL

- Initiation of spontaneous labor remains obscure
- Chronic, long-term multi-factorial process rather than acute
- Break down in the mechanisms for maintaining uterine quiescence during pregnancy
  - Activation of the maternal or fetal hypothalamic-pituitary-adrenal axis associated with either maternal anxiety and depression or fetal stress
  - Infection
  - Decidual hemorrhage
  - Pathological uterine distention

Preterm Birth Preventable?

- 25% intentional due to health problems of the mother or the fetus (IUGR, Preeclampsia, Abruptio Placentae)
- 25% follow rupture of membranes
- 50% preterm labor may be responsive to treatments to prevent or delay delivery

Known Risk Factors

1. **Demographic Risks**
2. **Medical Risks**
3. **Behavioral and Environmental Risks**
4. **Other Risks**

Demographic Risks

- African-American (doubles the risk)
- < 17 or > 34 years old
- Low Socioeconomic
- Unmarried
- Did not complete high school
Medical Risks
- History of previous preterm birth (triples the risk)
- Multiple abortions
- Uterine anomalies
- Under weight or over weight prior to pregnancy
- Parity (0 or >4)
- Diabetes
- Hypertension

Medical Risks in Current Pregnancy
- Multiple gestation
- Infection
- Polyhydramnios
- Incompetent cervix
- Short interpregnancy interval
- Urinary tract infection
- Bleeding in the 1st trimester
- Placenta previa or abruptio
- Anemia
- Fetal Anomalies
- PROM
- Cervical length < 30 mm

Behavioral/ Environmental Factors
- Physically demanding work
  - Prolonged standing
  - Shift work
- Stress
  - Increased levels of adrenal corticotrophin hormone and cortisol
  - Suppression of immune system with increased risk of infection
  - Cortisol→ eventually prostaglandin production and oxytocin

Other Associated Factors
- Smoking
  - Possible causative in 34% preterm birth
  - Infant mortality 60% higher for smokers
- Nutrition
  - Inadequate weight gain most associated with preterm birth
  - Low pre-pregnancy weight has strongest evidence for preterm labor
  - Poor maternal gut microbiome
- Illegal Substances
- Abusive relationships

Preterm Labor Management
- Make accurate diagnosis
- Look for the cause
- Assess fetal status: deliver vs. tocolysis
- Choose tocolytic
- Improve outcome
  - Transport?, steroids, group B strep (GBS), prophylaxis, Neuroprophylaxis

Nursing Assessment of PTL Patient
- Review of history-OB and other for risk factors
- Prenatal Data
- Psych/Social Assessment
- Assess for current signs/symptoms of PTL
- Physical Assessment
  - Vital Signs: Temp, HR, RR and BP
  - Fetal Monitor: FHR, Pattern and Uterine activity (palpation too)
Presence of signs and symptoms
- Signs and symptoms of uterine contractions
  - Low back pain
  - Pelvic pressure
  - Uterine tightening
  - Menstrual like cramps
  - Intestinal like cramps
- Change or increase in vaginal secretions
- Vaginal bleeding
- Signs and symptoms of UTI
- Signs and symptoms of pyelonephritis
- Asymptomatic bacteruria
- GI Upset
- Dehydration

Diagnostic Procedures
- CBC
  - WBC > 18,000 significant for infection in pregnancy
- Substance Abuse testing as indicated
- Fetal Fibronectin (fFN)
- Urinalysis and Culture
- Amniotic fluid (rarely done)
  - Gram Stain
  - Culture and Sensitivity
- Assess fetal lung maturity

Potential Physical Findings
- Cervical changes: softening, effacement, dilation, or shortening of cervical length
- Engagement of fetal head
- Elevated temperature
- Maternal tachycardia (r/t dehydration or infection)
- Costovertebral angle tenderness
- Urine with nitrites, leukocytes or WBCs and/or RBCs
- Positive Fetal Fibronectin
- Fetal tachycardia (may reflect maternal infection)

Potential Psychosocial Findings
- Stress factors
  - Anxiety
  - Fear of pregnancy loss
  - Fear of unknown
- Behavioral response
  - Confusion, restlessness, disorganization, and/or difficulty communicating
  - Expresses fears

Fetal Fibronectin
- Glycoprotein produced during fetal life
- Appear in cervical canal early and late pregnancy
- When found during mid-pregnancy (24-34 weeks) might predict PTL
- Negative predictive value 95%; Positive predictive value (25% - 40%)
- Best predictive for women who WILL NOT go into PTL
Fetal Fibronectin

- Fetal Fibronectin fFN
  - **Negative test**, < 3 cm
    - 99% undelivered at 7 days
    - 95% undelivered at 14 days
    - 90% undelivered at 21 days
  - **Positive test**, < 3 cm
    - 10-30% delivered < 7 days
  - Useful if short turnaround time
    - If a negative result will avoid treatment

Cervical Length

- Cervical Length
  - Cervical effacement much earlier sign than dilation or contractions
  - Difficult to assess with digital exam
  - Most accurate with US vaginal probe US
  - Cervical length is a bell curve.
    - Risk of spontaneous preterm delivery increases as cervical length decreases.
      - > 30 mm low risk for PTB
      - 20-30 mm moderate risk for PTB
      - <20 mm high risk for PTB

Diagnostic Procedures

- Cervical cultures
  - Group B Strep
  - GC and Chlamydia
- Wet mount
  - BV and/or Trichomoniasis
- Ultrasound examination
  - Gestational age, presenting part, cervical length, multiple gestation, placental location, evidence of fetal or uterine anomalies, amniotic fluid volume

Interventions: Who to treat?

- ACOG 2016:
  - Gestational age of fetus will benefit delay of birth by at least 48 hours
  - Generally not before neonatal viability unless associated with event know to cause PTL such as intra-abdominal surgery
  - Upper limit around 34 weeks
  - Risks of tx side effects vs. tx benefits

**Contraindications to Continuing Pregnancy**

**Maternal**
- Cardiac
- Thyroid
- Hypertension
- Infection
- Bleeding

**Fetal**
- Compromise
  - acute/chronic
- Maturity
- IUFD/anomaly
- Preterm anomaly

**Treatment/Management PTL**

- Corticosteroids - Betamethasone
- Antibiotics – conservative
- Tocolytics – short term ad PRN
- Hydration
- Bedrest

**Betamethasone: Glucocorticoid**

- **Action:** Increases neonatal surfactant assists with lung maturity
- **Indications:** < 34 weeks and absence of infection
- **Side effects:** Hyperglycemia, edema (pulmonary edema if on MgSo4)
- **Dose and Route:** Betamethasone: 12mg IM q24h x 2 doses
  - Dexamethasone: 6mg IM q 12 h x 4 doses
    (use only if Betamethasone is not available)

**Infection and PTL - Antibiotics**

- Bacterial Vaginosis increase risk 40%
- Bacteruria increased risk 50%
- Cervicitis: Syphilis and GC increased risk 50%
- GBS: Not known to cause PTL but associated with risk for newborn and maternal sepsis.

**Contraindications to Tocolysis**

- Intrauterine fetal demise
- Lethal fetal anomaly
- Nonreassuring fetal status
- Pre-eclampsia with severe features or eclampsia
- HELLP – deteriorating maternal condition
- Maternal hemorrhage with hemodynamic instability
- Intra-amniotic infection – maternal sepsis
- Maternal contraindications to the tocolytic drug

**Preterm Labor: Tocolytic Drugs – Help to relax the uterus**

- **Magnesium sulfate** – for no longer than 72 hours (new ACOG bulletin with FDA black box warning – causes demineralization of fetal long bones and maternal bones)
  - 2 grams/hr for PTL
  - 1 grams/hr for neuroprophylaxis
  - **Dose:**
    - Load 4-6 grams over 20 min. IV, maintenance 1-4 gms per hour IV
    - Therapeutic Level: 4-7 mEq/l
  - **Antidote:**
    - Calcium Gluconate 1-3 grams for emergency treatment
Serum Magnesium Levels

<table>
<thead>
<tr>
<th>Serum magnesium level (mg/dL)</th>
<th>Associated clinical finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>5–8</td>
<td>Inhibition of uterine activity (therapeutic level)</td>
</tr>
<tr>
<td>9–13</td>
<td>Loss of deep tendon reflexes</td>
</tr>
<tr>
<td>≥14</td>
<td>Respiratory depression</td>
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Magnesium Sulfate: Neuroprophylaxis

- **Action:**
  - Mechanism is not well understood,
  - Antioxidant effects, reduction in proinflammatory cytokines, blockage of glutamate activated calcium channels, stabilization of membranes, increased cerebral blood flow, and prevention of large blood pressure fluctuations

- **Dose:**
  - 24-32 weeks
  - 4 gram bolus of magnesium sulfate over 20 minutes with a 1 gram/hour maintenance dose.

Nursing Implications

Magnesium Sulfate Administration

- Baseline vital signs
- Auscultate Lung sounds and bowel sounds q 8 – 12 hours
- Check reflexes
- Continuous EFM
- I&O
- Report oliguria (<30 mL/hour for 2 hours or <100 mL over 4 hours)
- Observe for Magnesium toxicity
  - Loss of deep tendon reflexes
  - Altered level of consciousness
  - Respiratory rate <12 per minute
- Loading dose: VS q15 minutes
- Maintenance dose: Vital signs Q 1 hour and reflexes q 4 hours

Tocolytics

- **Calcium channel blocker**
  - Nifedipine
    - Dose and Route: 10 - 20 mg q 4 hours,
    - Sustained release: 30 - 90 mg BID
- **Beta-mimetic**
  - Terbutaline – prn and only for 72 hours
    - 0.125 - 0.25 SQ or IV push
    - Contraindicated with vaginal bleeding
    - Cannot give if maternal HR > 120 bpm
- **Prostaglandin inhibitor**
  - Indomethacin
  - NSAIDs
    - Dosage and Route:
      - Indocin: 25-50mg BID or QID, PO.
      - Motrin: 400 - 600mg TID to QID, PO.

Hospital Management

- Bedrest
- Hydration
- Medication (Tocolytics and Steroids)
- Psychosocial Support
- Education

Bed rest

- Not research proven
- Approximately 1 million American Women/Year
- Muscular skeletal and cardiovascular deconditioning with symptoms that can last up to 6 weeks post partum
- Muscle atrophy begins within 6 hours
- DVT risk: 15.6 cases of DVT per 1,000 women placed on bed rest compared to 0.8 cases of thromboembolism per 1,000 women not placed on bed rest.
Management

- Nursing Care
  - Physical Environment
  - DVT prevention
  - DVT assessment
  - Psychosocial support
  - Education
  - Multidisciplinary rounds

Hydration

- Decreased intravascular fluid volume increases uterine activity
- No evidence that supports effectiveness of hydration
- I&O
- Pulmonary Edema risk when tocolytics added
- Patient Education about importance of hydration

Nursing Diagnosis

1. Risk for preterm birth related to signs and symptoms of uterine contractions and cervical changes prior to 36 weeks’ gestation
2. Fear related to unknown pregnancy outcome
3. Anticipatory grieving related to threatened pregnancy loss
4. Ineffective health maintenance related to insufficient knowledge to prevent preterm labor

Premature Rupture of Membranes

Etiology and Incidence

- Etiology unknown
  - Which came first, the infection or the rupture??
- Incidence
  - 10% of all pregnancies
  - 20-25% recurrence in subsequent pregnancies

Management of PROM

Preterm PROM
- Make accurate diagnosis
- Induce or delay labor
- Reduce mortality and morbidity
  - Steroids
  - Antibiotics
  - Others
- Initiate fetal surveillance
Morbidity and Mortality

- 25-45% of all preterm births
- Accounts for more preterm births than any other cause

Diagnosis of PROM

- Amnisure test
- Sterile Speculum exam
- Nitrazine paper
- Ferning of amniotic fluid
- No vaginal exam, assess cervical dilatation and effacement via speculum or US

Medical Management of PROM

- Bed rest with bathroom privileges
- WBC (repeat is symptomatic)
- Rule out other infections
- Temperature q 4 hours while awake
- Amniocentesis
  - Gram stain, culture, glucose and fetal lung maturity
- Antibiotics
- Expectant management
- Patient Education

Medical Management PROM >37 weeks

- Assess for signs of infection
- Antibiotic therapy if ROM >12 hours and delivery not eminent
- Deliver

Nursing Interventions

Assessment
- Signs and symptoms of infection
- Fetal status
- Patient Education
- Implications of PROM
- Expectant management re: possibility of preterm infant
- NICU consult
- Delivery preparation
- Psychosocial support

Common Themes of Patients and Families

- Concern for the baby
- Separation/Isolation
- Hospital environmental stresses
- Label of “high risk pregnancy”
- Loss of “normal” pregnancy
- Medical terminology
- Monotony and boredom
- Guilt and blame
- Body image issues
Common Themes of Patients and Families

Partner/support system
- Emotional burden
- Increase in physical tasks required to keep “home” running
- Loss of income
- Loss of partner
- Fear of partner’s health and of pregnancy outcome

Common Themes of Patients and Families

Children:
- Loss of normal routine
- Separation anxiety (age dependent)
- Fear of abandonment
- Fear of hospitals

Antepartum Support

GOAL: Focus on reducing the stress associated with hospitalization and coping with the uncertainty of the pregnancy outcome

1. Set short-term goals that are more realistic
2. Acknowledge important role patient has in bringing a healthy baby into this world.
3. Educate in non-technical language, speak to the feelings and concerns underlying the questions.
4. Give woman as much control as possible
5. Help her focus on the possibilities instead of the problems.