Pulmonary Disease in Pregnancy

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Scott & White Clinic
TAMUHSC
Educational overview

- Review respiratory physiologic changes related to pregnancy
- Discuss implications of respiratory diseases and their treatments during pregnancy
  - * asthma
  - * pneumonia
  - * cystic fibrosis
  - * tuberculosis
  - * sarcoidosis
Pulmonary physiologic adaptation during pregnancy

-30 -20 -10 0 10 20

O2 consumption
PaO2
Bld O2 content
pH

% change at term
Pulmonary physiologic adaptation during pregnancy

% change at term

-20 -10 0 10 20 30 40 50

Peak flow
FEV1
Resid cap
Vital cap
Resp rate
Tidal vol
Min vent
Pathophysiology of asthma
chronic condition with acute exacerbations

- Inflammatory cells release cytokines
  - Destroys epithelial cell layer integrity
- Disrupts autonomic neural control of airway tone
  - Alters mucociliary function, narrowing airway lumen
Moderators of asthma course during pregnancy

Positive
- Progesterone broncho-dilation
- Increased serum cortisol

Negative
- Non-compliance
- Increased gastro-esophageal reflux

“net neutral”
Perinatal outcomes for asthmatic women (n=817)

NS neonatal outcomes:
• RDS
• LBW
• Anoms

* OR CI signif > 1

OG 1998;92:435
Components of asthma therapy

- Patient education
- Avoid/control asthma triggers
- Objective measures for monitoring lung function
- Stepwise pharmacologic therapy
Treatment of asthma in pregnancy

“The most common errors leading to adverse outcome are the under-estimation of asthma severity and under-treatment of exacerbations.”

NIH 1993
## Asthma Classification


<table>
<thead>
<tr>
<th>Classification</th>
<th>Day sx$s</th>
<th>Night sx$s</th>
<th>PEF or FEV1</th>
<th>PEF Variability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe Persistent</td>
<td>Continual</td>
<td>&lt;= 60%</td>
<td>Frequent</td>
<td>&gt;30%</td>
</tr>
<tr>
<td>Moderate Persistent</td>
<td>Daily</td>
<td>60-80%</td>
<td>&gt;1 nite/wk</td>
<td>&gt;30%</td>
</tr>
<tr>
<td>Mild Persistent</td>
<td>3-6 d/wk</td>
<td>&gt;= 80%</td>
<td>&gt;2 nite/mo</td>
<td>20-30%</td>
</tr>
<tr>
<td>Mild Intermittent</td>
<td>&lt;= 2 d/wk</td>
<td>&gt;= 80%</td>
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Treatment of asthma during pregnancy

Contraindicated for...

- Inhaled β agonists
- Inhaled corticosteroids
- Cromolyn
- Theophylline
- Leukotriene receptor antagonists
- Anticholinergic
- Systemic corticosteroids

Pregnancy? Lactation? N O
# SWHP Formulary Choices

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<tr>
<th>Drug</th>
<th>Dosing</th>
<th>Rel Cost</th>
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<tr>
<td>Albuterol</td>
<td>2-4 puffs prn (mild)</td>
<td>$</td>
</tr>
<tr>
<td>Azmacort (triamcinolone)</td>
<td>2 puffs bid to 4 puffs qid (max 16/d)</td>
<td>$$</td>
</tr>
<tr>
<td>Flovent (fluticasone)</td>
<td>2-4 puffs bid (220 mcg/puff)</td>
<td>$$$$$$$</td>
</tr>
<tr>
<td>Pulmicort (budesonide)</td>
<td>1 puff qd to 4 puffs bid (max 8/d)</td>
<td>$$$$$$$</td>
</tr>
<tr>
<td>Cromolyn</td>
<td>2-4 puffs tid – qid</td>
<td>$$$</td>
</tr>
<tr>
<td>Theophylline</td>
<td>300 – 800 mg/d</td>
<td>$$</td>
</tr>
<tr>
<td>Singulair</td>
<td>10 mg qhs</td>
<td>$$$$$$$</td>
</tr>
<tr>
<td>Ipratropium</td>
<td>2 puffs qid</td>
<td>$$$$$$$</td>
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ACOG-ACAAI: Rx recommendations

- Reserve the use of these newer drugs (with limited human data) for those pregnant women with proven pre-pregnancy benefit
  - salmeterol
  - nedocromil
  - leukotriene antagonists

Ann All Asth Imm 2000;84:475
Hospital management of asthma exacerbation

- β agonist q 20 min x 3 then q 1-2 hr until significantly improved (MDI or nebulizer)
- Supplemental O2 : SO2 ≥ 95%
- Systemic steroids if PEFR < 200 (or ≤ 40% baseline) after 1 hr treatment (methylprednisolone 1 mg/kg IV q 6-8 h)
- Ipratropium bromide, 4-8 puffs MDI
- IVF only to eliminate Dehydration
- ABX if purulent sputum, fever, or abnl CXR
- ICU criteria:
  - PEFR <25%
  - PCO2 > 35 mm Hg
Intrapartum management of asthma

- Maintain medication routine
- Adequate hydration
- Adequate analgesia (avoid morphine & meperidine … histamine release)
- Stress dose steroids if systemic steroids used during pregnancy
- PEFR q 12 h if severe asthma
- PGE OK … avoid PGF
PTL mgmt in asthmatics

- MgSO4 also causes bronchial smooth muscle relaxation
- Avoid a second β-adrenergic agent
- Avoid indomethacin in women with ASA sensitivity
Postpartum mgmt for asthmatics

- Postpartum hemorrhage
  - Oxytocin is drug of choice
  - PGE is not contraindicated
  - methylergonovine causes bronchospasm
  - PGF causes bronchospasm

- Continue medication routine

- Asthma exacerbation more common after cesarean than vaginal delivery (RR=18)
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Comp OB Clinic patient

- 32 yo P0, LMP 6 wks ago, with hx of CF

- Concerns???????
Cystic Fibrosis
Epidemiology

- Most common AR disorder among white Americans (1/25-30 carrier rate whites and Ashkenazi Jews, vs 1/65 among blacks)
- Incidence: 1/2500
- Improved mortality rate due to improved pulmonary toilet and antibiotics:
  - survival >12 yrs: 70%
  - survival >30 yrs: 30%
Cystic Fibrosis
Genetics

- Autosomal recessive
- >150 identified CF mutations
- DNA testing practically identifies only up to 80% of mutations (varies by ethnicity)
Cystic Fibrosis

Maternal pregnancy risks

- Deterioration of pulmonary function: reduction of vital capacity, FEV1, FVC, and residual volume can lead to hypoxemia
- Diabetes
- No increase in maternal mortality rate
Cystic Fibrosis

Individual maternal risk assessment

Predictors of poor outcome

- FEV1 or Vital capacity < 50% predicted
- PaO2 < 60 mm Hg (no infection)
- Pulmonary HTN: mortality 50%
- Weight gain < 4.5 kg
Cystic Fibrosis
Fetal/neonatal risks

- Preterm delivery (1/4)
- No increase in rate of miscarriage
- Risk of genetic transmission
Cystic fibrosis
Antenatal management

- Routine GDM screen
- Avoid aminoglycosides if possible
- Follow weight gain
Cystic fibrosis
Intra- and post-partum management

- Attention to fluids, electrolytes
- Liberal oxygen supplementation
- Regional anesthesia preferred over general
- Encourage breastfeeding
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Continuity clinic patient

- 29 yo P2022 @ 29 wks
- PMH neg except tobacco use
- 2 d hx of fever, cough, sputum
- Exam: pulm consolidation

Concerns ???
Pneumonia during pregnancy

- Pregnancy DOES reduce tolerance for loss of ventilatory capacity (prompt aggressive rx important)
- Pregnancy does NOT impact
  - incidence
  - mortality rate
  - spectrum of pathogens
Pneumonia pathogens in pregnancy

- S pneumo
- H influenza
- M pneumo
- Legionella
- S aureus
- Influenza A
- Other

%
Management of pneumonia during pregnancy

- Hospitalization
- O2 as needed
- IV Abx:
  - ceftriaxone 1 g/d + azithromycin 500 mg/d, until afebrile 3-5 d (Sanford, 2004), or …
  - erythromycin 500 mg q 6 h
- 2 d after starting erythromycin, intermittent fever persists (Tm 100.6), cough/sputum & oxygenation improved, consolidation on exam unchanged; CXR shows progressive consolidation & effusion … now what?
  - Clinical improvement is appropriate; CXR findings are typical
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BCHD patient

- 28 yo P4004, “Spanish only”
- ROS negative (no wt loss, fever, cough, sputum)
- PPD + (10 mm induration)

Concerns ????
TB screening in pregnancy

- PPD is NOT contraindicated during pregnancy
- Pregnancy does NOT affect response to PPD

Priorities for PPD screening
- TB signs or symptoms
- Known or suspected exposure, including workplace
- Medical risk factors (immunosuppression)
- Socioeconomic/demographic risk factors
## Perinatal risks of TB

### Maternal
- No consistent negative impact of TB on pregnancy
- Preg does NOT alter natural hx of TB, including devlpt of active disease

### Fetal
- PTD
- LBW
- Congenital infxn RARE; risk greater 2/to resp route as neonate
Effect of TB treatment on fetus

- “First-line” antibiotics (INH, rifampin, ethambutol) have no known teratogenicity or fetal toxicity
- Safety data insufficient to recommend pyrazinamide
- Contraindicated TB drugs:
  - Streptomycin
  - Kanamycin
  - Amikacin
  - Capreomycin
  - Fluoroquinolones
  - Rifabutin

ATS, CDC, IDSA
Joint Statement
MMWR 6/03
TB treatment during pregnancy

- **Active TB**
  - INH, Rifampin, Ethambutol x 2 mos, then …
  - INH + Rif x 7 mos

- **Latent TB** (asx’ic, pos PPD, neg CXR)
  - Rationale: prevent 5% active disease progression within 1 yr of PPD conversion
  - pregnant pts at low risk may have treatment delayed until after delivery
  - INH 300 mg po qd x 9 mos (or 900 mg 2x/wk), plus …
  - pyridoxine 50 mg po qd

ATS, CDC, IDSA
Joint Statement
Website update 6/05
Postpartum management of TB

- If ACTIVE maternal TB recognized in the peripartum period, neonate should be isolated from mother for 2 wks while rx started (otherwise, no need for isolation)
- Breast feeding is not contraindicated; monitor baby (also receiving antibiotics) for toxicity
- Small amount of antibiotics received via breastmilk is NOT a substitute for direct neonatal treatment
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