



Acute and Chronic Respiratory Disease in Pregnancy




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Disclosures



- None

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Objectives



- Describe common pulmonary processes occurring in young women
- Describe maintenance medications that are used in pregnancy
- Identify medications used for chronic respiratory conditions that are unsafe during pregnancy
- Describe oxygen delivery devices

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Respiratory diseases of young women

- Asthma
- Restrictive lung disease
 - CT-ILD, sarcoidosis, post-covid, kyphoscoliosis
 - Lupus, vasculitis
- Cystic fibrosis
- Pulmonary hypertension
- Obstructive Sleep Apnea

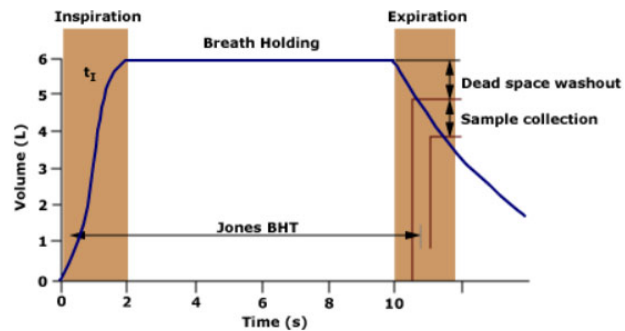
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Quick run down of PFTs

- Spirometry
- Lung volumes
- DLCO
- 6 minute walk test

Single breath DLCO maneuver

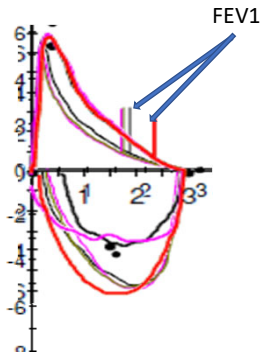


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Asthma

- Reversible airflow limitation
 - Symptom based management
 - Stepwise approach
 - Step up/Step down
 - “controller” inhalers vs PRN ICS/LABA for symptoms
 - Biologic therapy for severe asthma
 - Asthma comorbidities and control
 - GERD
 - Allergic/nonallergic rhinitis
 - Obesity



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Asthma in pregnancy

- Classic “rule of thirds”
- Potential pregnancy related effects on type 2 inflammation
- Asthma control and maternal/fetal outcomes
- Medication management
 - Controller medication use in patients with moderate or severe asthma
 - Concerns regarding medication adherence
 - Concerns regarding fetal effects of medications
 - Unknowns in newer meds

Monoclonal antibodies for asthma

- Omalizumab, anti IgE
 - First approved asthma monoclonal
 - EXPECT published in 2014, f/u in 2019
- Mepolizumab, anti IL-5
 - Animal studies without effect on fetal growth/development (mice, monkeys)
 - 2 published case reports Registry: www.mothersandbabies.org/asthma
- Reslizumab, anti IL-5
 - Animal studies without effect on fetal growth (mice, rabbits)
 - No registry available

Monoclonal antibodies in asthma

- Benralizumab, IL-5 alpha receptor blocker
 - Animal study with monkeys, no observed teratogenicity
 - Case report with late preterm delivery by C-section
 - Registry: mothertobaby.org/fasenra
- Dupilumab, IL-4Ralpha blocker, blocks IL-4 and IL-13 responses
 - Animal study with monkeys, no observed teratogenicity
 - Case series, no reported teratogenic effects
 - Registry: www.mothertobaby.org/ongoing-study/dupixent
- Tezepelumab, TSLP blocker
 - Animal studies with monkeys no teratogenic effects
 - No registry available

Not all that wheezes is asthma...

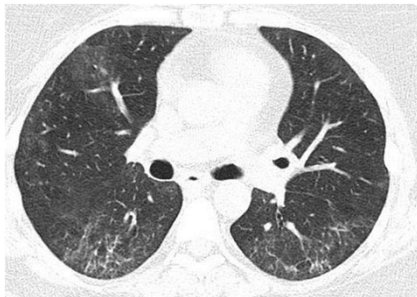
- Differential must remain broad
 - Heart failure, cardiomyopathy
 - Pneumonia
 - Vocal cord dysfunction
 - EGPA
 - ABPA

Not all asthma wheezes...

- Cough as a significant marker for asthma
- Chronic cough has significant implications for quality of life

Restrictive lung disease

- CTD-ILD
- Systemic Sclerosis
- Familial ILD
- Sarcoidosis
- Immunosuppression
- Stability over time
 - PFTs every 3 months or as clinically indicated
- Imaging
 - CXR and cross-sectional imaging
 - 7 millisieverts for non-con
 - 1.6-4 millisieverts for high rez



Pregnancy related changes in PFTs

- Reduction in FRC
- Exertion and change in tidal volume before respiratory rate
- Dyspnea related to limitation in FRC

Medications for ILD

- Corticosteroids
 - Prednisone/prednisolone (Thumbs up)
- Azathioprene (thumbs up)
- Mycophenolate mofetil (thumbs down)
- Biologics
 - Rituxumab (yes with a but)
 - Tocilizumab
- Antifibrotics
 - Nintedanib (thumbs down)
 - Pirfenidone (thumbs down)

Cystic Fibrosis

- Autosomal recessive CFTR gene mutation
- Causes thick, tenacious secretions and chronic infections leading to bronchiectasis
- Chest physiotherapy
 - Mucolytic therapy
- Management of exacerbations
- Prevention of exacerbations
 - Suppressive antibiotics
- Non-pulmonary complications
 - Malabsorption/malnutrition
 - Diabetes
 - DIOS



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Pre-pregnancy planning for CF

- Spirometry
- Nutritional status and BMI
- Vitamin levels, supplementation
- Genetic counseling
- Diabetes evaluation

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Exacerbation prevention in CF

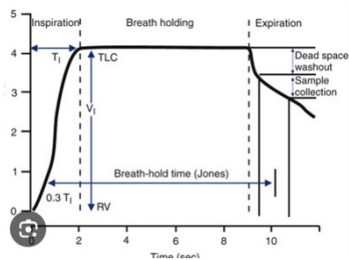
- Chronic azithromycin therapy
- Inhaled antibiotics
 - Tobramycin, Aztreonam, Colymycin, Levofloxacin

CFTR Modulator Therapies

- Ivacaftor
- Lumacaftor/ivacaftor
- Tezacaftor/ivacaftor
- Elexacaftor/tezacaftor/ivacaftor

Pulmonary arterial hypertension

- Obliterative vasculopathy (capillary dropout)
- Right ventricular failure
- Isolated reduction in DLCO
- Establish underlying diagnosis
 - WHO groups
- Establish functional class
 - WHO functional class
 - NYHA functional class
- Fluid management
- Medication management



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Considerations

- Counselling against pregnancy (?)
- Consideration of termination (?)
- Prophylactic anticoagulation
- Oxygen supplementation
- Diuretic use
- Fluid restriction
- Frequent use of echocardiography

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PAH Therapies

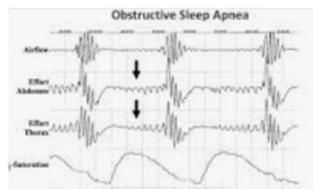
- Calcium Channel Blockers
 - Nifedipine, diltiazem
- Prostaglandins
 - Epoprostinol, Treprostinil, iloprost
- Phosphodiesterase 5 inhibitors
 - sildenafil
- ~~Endothelin receptor antagonists~~
 - ~~Macitentan, abrisentan, bosentan, sitaxentan~~
- ~~Soluble guanylate cyclase stimulator~~
 - ~~riociguat~~

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Obstructive Sleep Apnea

- Prevalence of 3-27%
- Obesity as a significant risk factor
- Generally increases with gestational age
- Hormonal factors may impact increase in prevalence
- Diagnosis with Polysomnogram
 - Positive airway pressure
 - Nerve stimulation devices
 - Oral mandibular advancement device



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Complications of OSA

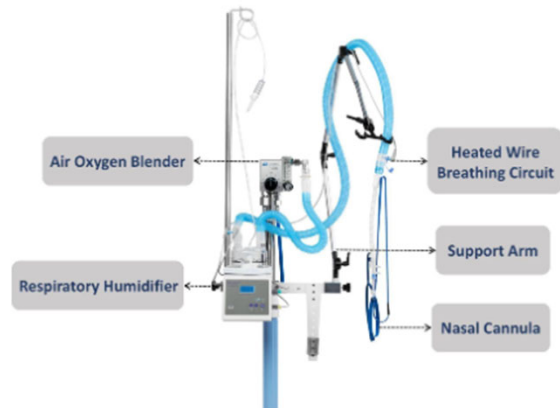
- Preeclampsia
- Gestational diabetes
- Maternal hypertension
- Increased risk of cardiomyopathy, heart failure, PE and mortality
- Neonatal complications
 - Low birth weight
 - Premature birth
 - NICU admission

Oxygen delivery devices

- High flow nasal oxygen
 - Heated high flow nasal cannula
 - High velocity nasal insufflation
- Positive airway pressure
 - Continuous
 - Bilevel

High flow nasal cannula

- Heated, humidified air
- Flow rate up to 60 liters per minute
- Fraction of inspired oxygen 21-100%



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Heated high flow uses/benefits

- Reduced work of breathing
- Improve tidal volume
- Modest increase in end expiratory pressure
- Enhanced clearance of secretions
- Reduction in physiologic dead space

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Non-invasive Positive Pressure Ventilation



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NIPPV effects

- Increase in mean airway pressure
- Effective oxygen delivery
- Reduction in work of breathing
- Clearance of CO₂
- Hemodynamic effects on pre-load and afterload

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Recognition of deterioration

- What is “stable”?
 - What does the trajectory look like and how quickly are things changing?
 - Physical evaluation, distress, respiratory muscle use
 - Beware minimizing symptoms, dyspnea or distress
- What tests to order, how to interpret?
 - ABG vs VBG
 - Imaging
- When to call for help?

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