Module 21

Cardiovascular and Respiratory Conditions Acute and Emergent Presentations

CANADIAN HEALTH CARE AGENCY
EXPERIENCE THE NORTH

Part One: Cardiology

- Cardiac history
- Physical Exam
- Differential Diagnoses
- Electrocardiogram (ECG)
- Basic ECG Interpretation

1B: Cardiac Conditions

- Congestive heart failure
- Ischemic disease

1C: Cardiac Emergencies

- Myocardial infarction

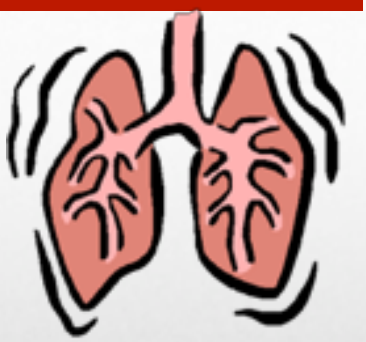
1D: Paediatric Considerations

- Assessment of infants and children
- Cyanosis in newborn
- Rheumatic Fever (Carditis)

Objectives

Part Two: Respiratory

- Respiratory physiology and history
- Physical Exam
- Differential Diagnoses
- Pulmonary Function Testing/ Spirometry



2B: Respiratory Conditions

- Asthma
- Community Acquired Pneumonia

2C: Respiratory Emergencies

- Flail Chest

2D: Paediatric Considerations

- Assessment of infants and children
  - History and physical findings
- Bronchiolitis
- Cyanosis in newborn
- Influenza vs. Common Cold

Objectives

PART 1: CARDIOLOGY

History

- Medical
- Family
- Personal and social

Cardiac Symptoms of Illness

- Chest pain
- Shortness of breath
- Fainting or syncope
- Palpitations
- Edema
- Sputum
- Cyanosis
- Cool Extremities

History and Presenting Illness

Vital Signs

- General appearance
- Temperature
- Pulse and respiratory rate
- Oxygen saturation

Head and Neck

- Central cyanosis
- Colour of lips
- Jugular venous pressure

Extremities

- Temperature
- Colour
- Peripheral Pulses
- Capillary Refill

VIDEO: https://youtu.be/2gYuayRUbt0

Physical Exam

Inspection of Anterior Chest

- Visible pulsations in chest wall
- Accessory muscle use

Palpation

- Location, quality, and intensity of apical beat
- Heave
- Thrill

Physical Exam

Auscultation

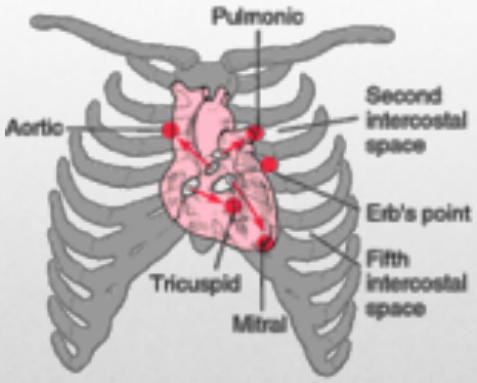
- Use diaphragm and then bell of stethoscope

Heart Sounds

- Determine rate and rhythm

Murmurs

- Timing, quality, intensity
- Radiation
- Pitch



Physical Exam

Abnormalities in Heart Sounds

- S3 – volume overloaded ventricle
- S4 – pressure overloaded ventricle

Chest pain

- Angina, aortic dissection, myocardial infarction, pneumonia, pericarditis, esophageal or gastric disorder

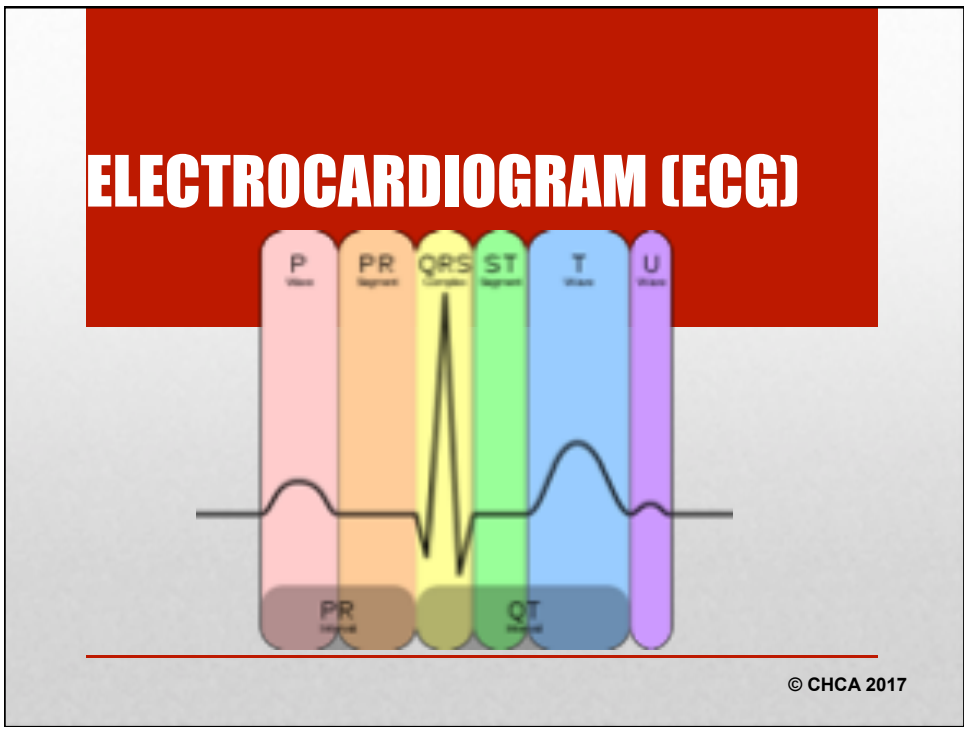
Fainting and syncope

- Postural hypotension, seizure, head trauma, hypoglycemia

Palpitations

- Sinus tachycardia, Wolff-Parkinson-White syndrome

Differential Diagnoses


ELECTROCARDIOGRAM (ECG)
P
PR
QRS
ST
T
U
PR
QT
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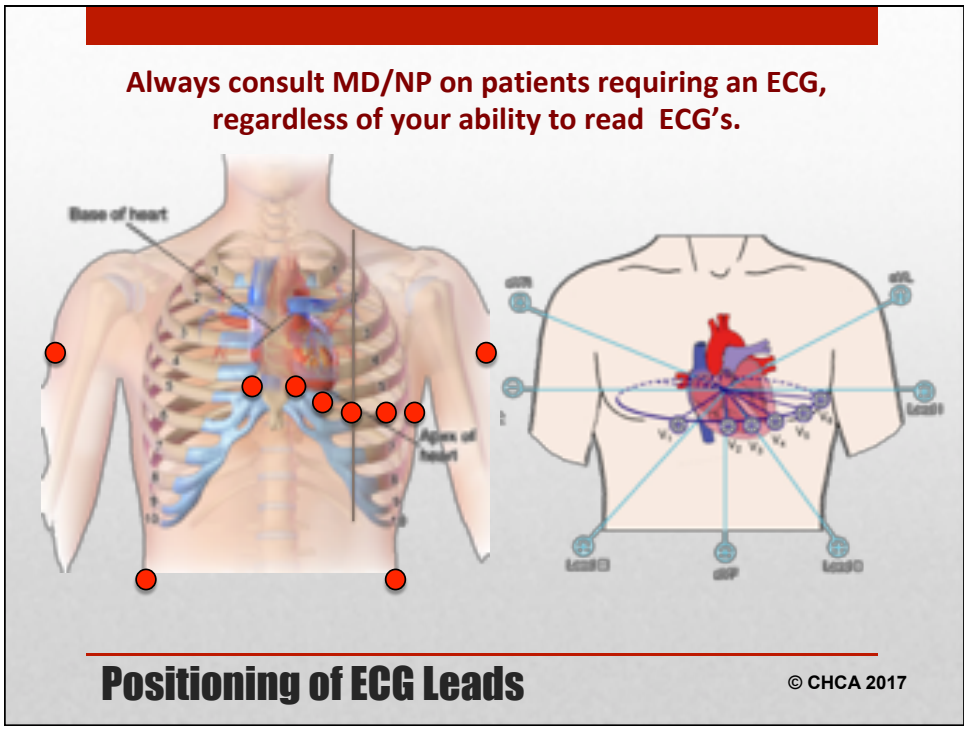
Always consult MD/NP on patients requiring an ECG, regardless of your ability to read ECG's.
Base of heart
Apex of heart
Positioning of ECG Leads
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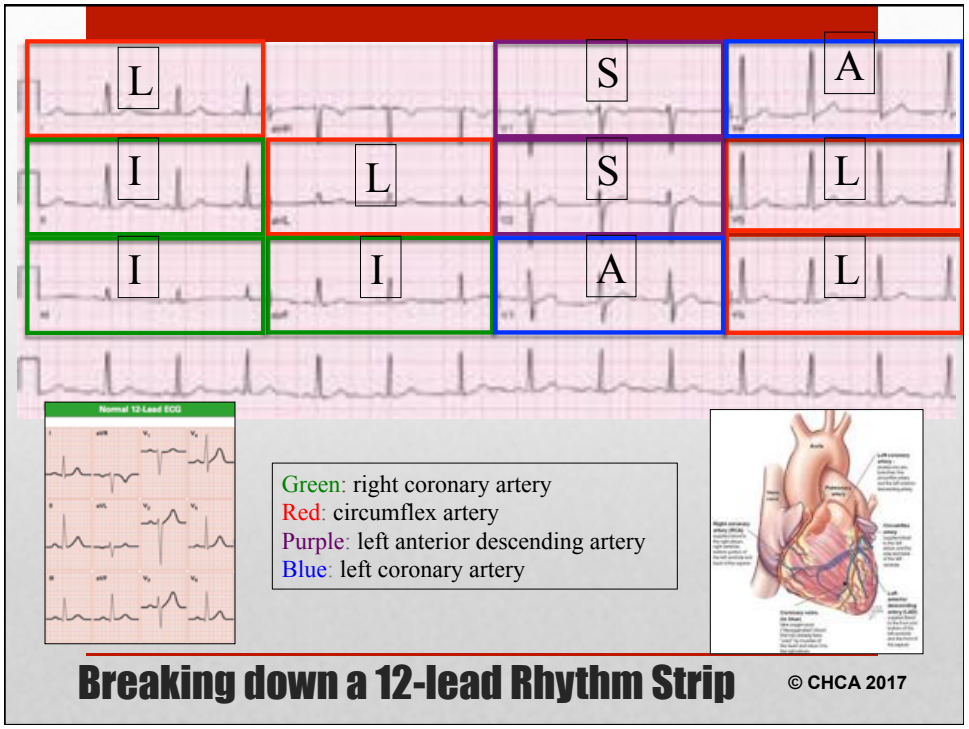
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Green: right coronary artery
Red: circumflex artery
Purple: left anterior descending artery
Blue: left coronary artery
Breaking down a 12-lead Rhythm Strip
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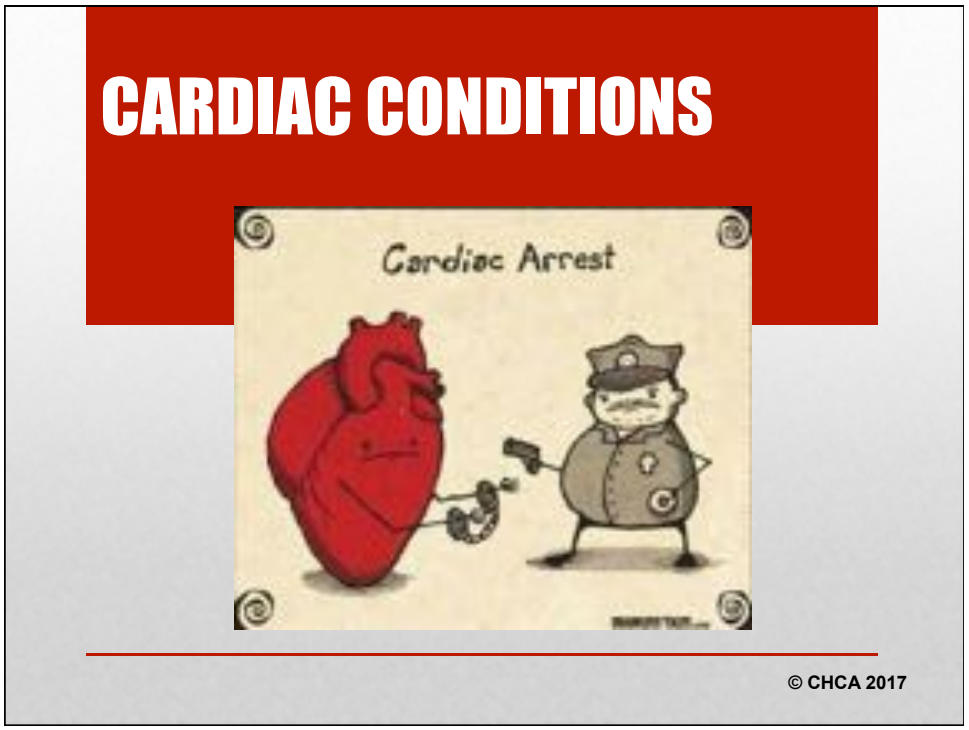
CARDIAC CONDITIONS
Cardiac Arrest
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An accumulation of fluid peripherally (right ventricular failure) or in the lungs (left ventricular failure), or both, from inadequate functioning of the heart.

Congestive heart failure is a complication of an underlying disease process.

Right Ventricle vs. Left Ventricle heart failure

Signs and symptoms

- Adult: increased heart rate and respiratory rate, low SBP (<90 mmHg), heart murmur
- Elderly: delirium or confusion, falls, malnutrition

Very Different Presentations!

Left-sided CHF	Right-sided CHF
• most common type • Left Ventricle doesn't properly pump blood out to the body • Fluid can build up in the lungs, making breathing difficult.	• Right Ventricle has difficulty pumping blood to the lungs. • Blood backs up in the blood vessels • Causes fluid retention in the lower extremities, abdomen, and other vital organs.

Common Conditions: Congestive Heart Failure

Pharmacological Interventions: (MD/NP consult)

- **ACE inhibitors**: Vasotec (Enalapril), Altace (Ramipril)
- **Diuretics**: Furosemide (Lasix), Metolazone (Zaroxolyn), Hydrochlorothiazide (HydroDIURIL), Spironolactone (Aldactone)
- **Beta-Blockers**: Metoprolol (Lopressor), Bisoprolol (Monocor), Carvedilol (Coreg)
- **Digitalis Compounds**: Digoxin, Lanoxin

Non-Pharmacological Management:

- Limit Sodium 2-3 grams/day stable patient
- Fluid Restriction 1500/2000cc day
- Rest and exercise

Common Conditions: Congestive Heart Failure

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Angina Pectoris

- A result of myocardial ischemia
- Oxygen demands of the myocardium exceed the supply of oxygenated blood by coronary arteries causing pain.

Unstable Angina

- Acute plaque rupture with incomplete or transient occlusion of the blood vessel
- New cases diagnosed as unstable

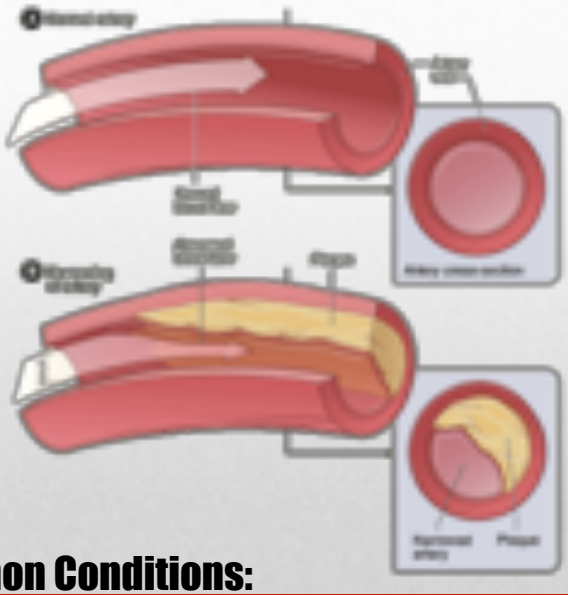
Chronic Stable Angina

- Due to fixed stenosis
- Pressure in anterior chest brought on by exertion, emotion, eating
- <15 min duration, relieved by rest and nitroglycerin

Myocardial Infarction:

- Total coronary occlusion with acute plaque rupture resulting myocardial necrosis

Common Conditions:
Ischemic Disease



Common Conditions:
Ischemic Disease

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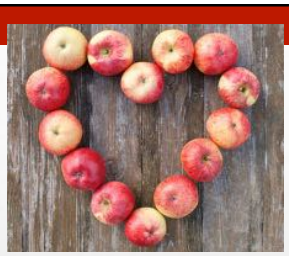
Physical Findings

- Diaphoresis
- Tachycardia
- Elevated hypertension
- Elevation or depression of ST segment, inversion of T wave

Diagnostic Tests

- 12-lead ECG tracing – for comparison with previous if available.
  - look for: depression of ST segment, ST segment elevation, inversion of T wave, any other new changes
- Obtain blood work in anticipation of medevac: CBC, Random glucose, electrolytes, and baseline cardiac enzymes (CK, troponin)



Pharmacologic Management

- Nitroglycerin, 0.4 mg sublingual (SL) spray q5min X 3 doses prn
- **If pain not relieved in 3 doses, treat as acute myocardial infarction**
- For longer term control, MD/ NP may order:
  - Beta-blockers
  - Calcium channel blockers
  - ACE inhibitors

Common Conditions: Ischemic Disease

Clinical Presentation in Women

- Chest pain at rest or during sleep
- Feeling of malaise prior to event, dizziness
- Pain in back, neck, throat
- SOB, fatigue, flushing, nausea
- Ankle swelling

Common Conditions: Ischemic Disease

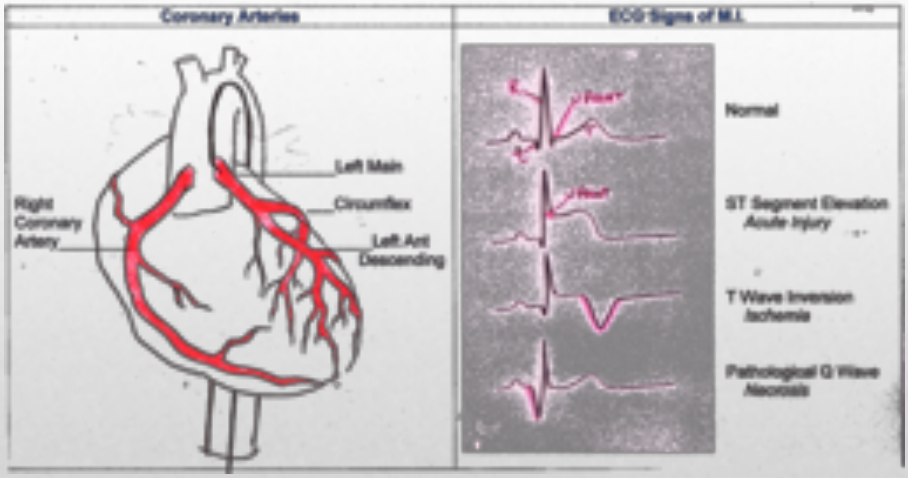
History

- Acute retrosternal chest pain – heaviness, aching
- Pain may radiate into left arm, neck, fingers, shoulders
- Pain not relieved by nitroglycerin
- Lasts >30 min

Diagnostic Tests

- Obtain a 12-lead (ECG) tracing; compare with a previous tracing if available
- Check for *Q waves*, elevation of *ST segment* and inversion of *T wave* (signs of myocardial infarction)
- Check for depression of ST segment, inversion of T wave (angina)
- Obtain blood work in anticipation of medevac: CBC, Random glucose, electrolytes, and baseline cardiac enzymes (CK, troponin)
- If the patient has continuing pain, repeat 12-lead ECG twice more at 30-minute intervals, noting any evolving changes.

Emergency Presentations:
Myocardial Infarction



Emergency Presentations:
Myocardial Infarction

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Pharmacological Management

- Sublingual nitroglycerin 0.4 mg spray prn but only if systolic blood pressure (BP) > 100 mm Hg
- If pain unrelieved: morphine, 2–5 mg IV
- MD/ NP order for Beta-blockers: metoprolol 50 mg PO BID (range 50–200 mg bid)
- Arrange for Medevac

Emergency Presentations:
Myocardial Infarction

Assessment of Infants and Children

Ask about:

- Rapid or noisy breathing
- Cough
- Cyanosis
- Sleeping patterns
- Exercise tolerance: indicated in a young child by ability to feed and in an older child by ability to keep up with peers during play

Auscultation:

- S1 and S2 heart sounds; Physiologic splitting of S2 heart sound
- Added heart sounds (S3 and S4): determine their location and relation to respiration

Cyanosis:

- Bluish discolouration MM, nail beds and skin; significant clinical finding

Paediatric Presentations:
Assessment

Rheumatic Fever (Carditis)

- Diffuse inflammatory disease of connective tissues, which involves the heart, joints, skin, central nervous system and subcutaneous tissue.
- Arises from immune complications of group A ß-hemolytic streptococcal infection from pharyngitis or cellulitis 2-5 weeks prior to onset.

Symptoms:

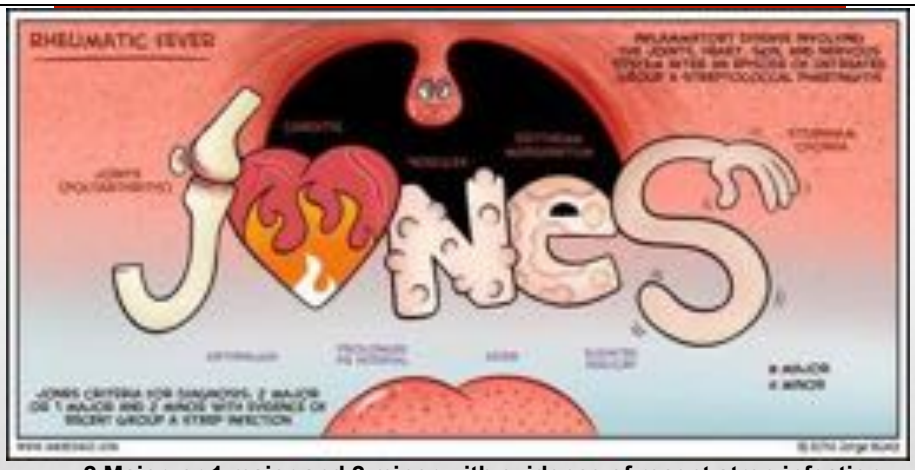
- Fever
- Joint pain,
- Redness and swelling (migratory arthritis, typically involving the large joints)
- Shortness of breath,
- Edema,
- Cough,
- Fatigue (representing heart failure)
- Rash (erythema marginatum)

Non-pharm Interventions – Medevac

Pharmacologic Interventions

- Treatment involves antibiotics against group A strep, anti-inflammatories and if needed, therapy for heart failure.
- Medications should not be started until the diagnosis has been clearly established, and only with a MD/NP consult.

Paediatric Presentations:
Rheumatic Fever (Carditis)



2 Major, or 1 major and 2 minor with evidence of recent strep infection

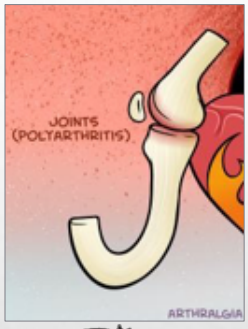
Major:

1. Joints (polyarthritis)
2. Carditis
3. Sub-Q Nodules
4. Erythema Marginatum
5. Sydenham Chorea

Minor:

Arthralgia
Prolonged P-R interval
Fever
Elevated ESP/ CRP

Jones Criteria for Rheumatic Fever

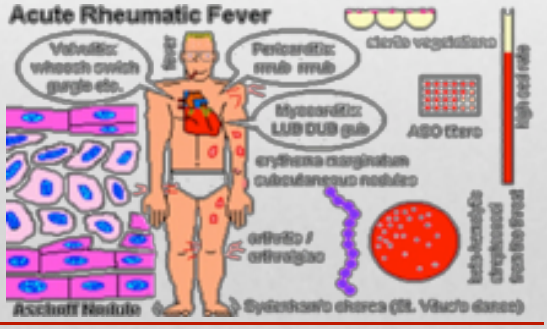


- Earliest symptomatic manifestation of ARF: presents within 21 days of GAS infection.
- More common and more severe in teenagers and young adults, may be severe enough to severely limit movement.
- Affects several joints in quick succession, for 2 to 7 days, giving the appearance of "migration" from joint to joint (knees, ankles, elbows, and wrists)
- Radiographic evaluation of affected joints is not routinely performed.

Rheumatic Fever – Arthritis ("Joints")

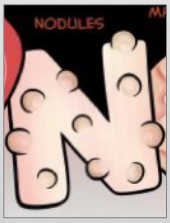
https://www.youtube.com/watch?v=6StYVx6BVLo

- Myocarditis and pericarditis may occur in ARF, the predominant manifestation of carditis presents as a ***valvulitis***, especially of the ***mitral*** and ***aortic*** valves.
- Valvulitis is established by auscultatory findings with echocardiographic evidence of mitral or aortic regurgitation.
- Damage to cardiac valves may be progressive and chronic, resulting in cardiac decompensation.



Rheumatic Fever - Carditis

- Subcutaneous
- Painless, Pea Sized
- Firm, non-tender
- Most common along exterior surfaces of bone, knees
- Lasts a few days, usually resolved without incident.



Must have a history of strep infection, throat etc. to qualify

Rheumatic Fever –Nodules

- Evanescent, pink or faintly red, nonpruritic rash involving the trunk and sometimes the limbs but not the face.
- Usually occurs early in the course of ARF,
- In some instances, it persists or recurs after all other manifestations have resolved.
- Erythema marginatum most commonly occurs in patients with acute carditis but has been reported in patients with chronic carditis.
- It rarely occurs as the sole manifestation of ARF.
- The outer edge of the lesion is sharp; the inner edge is diffuse.
- The lesion is also known as "erythema annulare" since the margin of the lesion is usually continuous, making a ring
- Individual lesions may appear, disappear, and reappear in a matter of hours. A hot bath or shower may make them more evident.

Rheumatic Fever – Erythema Marginatum

- Sydenham chorea (also known as "St. Vitus dance")
- Neurologic disorder consisting of abrupt, non rhythmic, involuntary movements, muscular weakness, and emotional disturbances.
- Typically presents one to eight months after a GAS infection, and may occur as an isolated finding.
- More common in girls and may present as refusal to go to school and self-isolation due to shame and embarrassment.
- Fully recovery usually within six weeks and nearly all within six months, with only rare cases described lasting longer than that.
- Movements are more marked on one side, are occasionally unilateral (hemichorea), and cease during sleep.

https://www.youtube.com/watch?v=-Os3T6Yz7w0

Rheumatic Fever – Sydenham Chorea

- **Laboratory studies** — include measurement of CRP or ESR to seek evidence of systemic inflammation and a complete blood count with differential to look for anemia and leukocytosis.

- **Cardiac evaluation** — Electrocardiogram(ECG) and echocardiogram (ECHO) are performed as part of the initial screening.

Rheumatic Fever – Laboratory and Cardiac Evaluation

TREATMENT — **CONSULT FOR MEDEVAC**
Treatment of ARF consists of anti-inflammatory therapy, antibiotic therapy, and heart failure management.

Goals of treatment — The four major goals of treatment are:
- Symptomatic relief of acute disease manifestations (eg, arthritis)
- Eradication of group A beta-hemolytic *Streptococcus* (GAS)
- Prophylaxis against future GAS infection to prevent progression of cardiac disease
- Provision of education for the patient and patient's caregivers

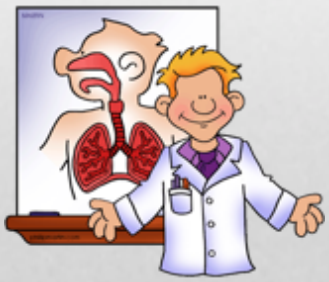
There is no therapy that slows progression of valvular damage in the setting of ARF.

Rheumatic Fever - Treatment

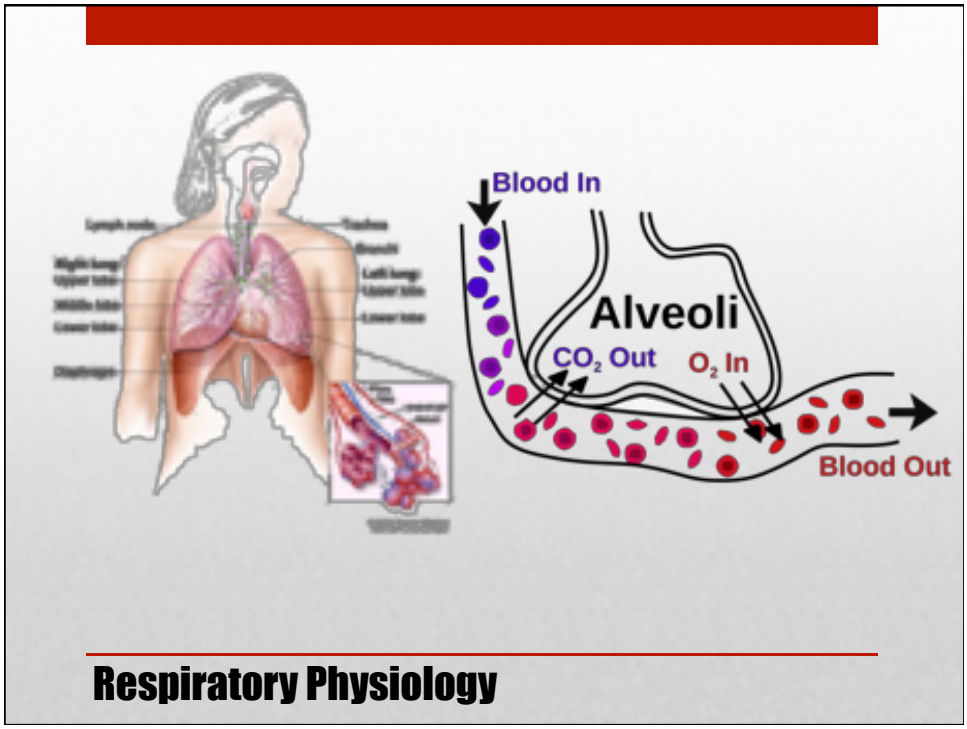
PART 2: RESPIRATORY

History
- Medical
- Family
- Personal and social

Respiratory Symptoms of Illness
- Cough
- Sputum
- Hemoptysis
- Shortness of Breath
- Chest Pain
- Wheeze



History and Presenting Illness



Respiratory Physiology

Medical

- Smoking history
- Frequency of colds or asthma treatments
- Bronchitis, pneumonia, COPD, tuberculosis
- Seasonal allergies

Family

- Others at home with similar symptoms
- Allergies, hypersensitivities

Personal and Social

- Exposure to second-hand smoke
- Exposure to respiratory irritants in occupation or environment
- Pets
- Crowded living conditions

History Taking

Physical Exam

Vital Signs

- General appearance
- Temperature
- Pulse and respiratory rate
- Oxygen saturation
- Acutely or chronically ill
- Degree of comfort and sweating
- Skin/ Lip Colour
- Nutritional status

VIDEO: https://youtu.be/2gYuayRUbt0

Physical Exam

IPPA format

Inspection, palpation, percussion, auscultation

Inspection

- Nasal discharge, sniffing
- Discharge at inner canthus of eyes
- Voice changes
- Coughing
- Colour of skin and lips
- Shape and movement of chest
- Use of accessory muscles
- Intercostal/ substernal indrawing

Palpation

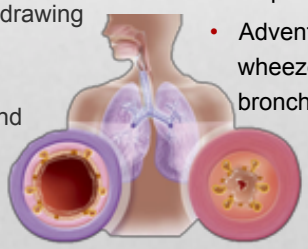
- Tracheal position
- Chest wall tenderness and expansion
- Spinal abnormalities

Percussion

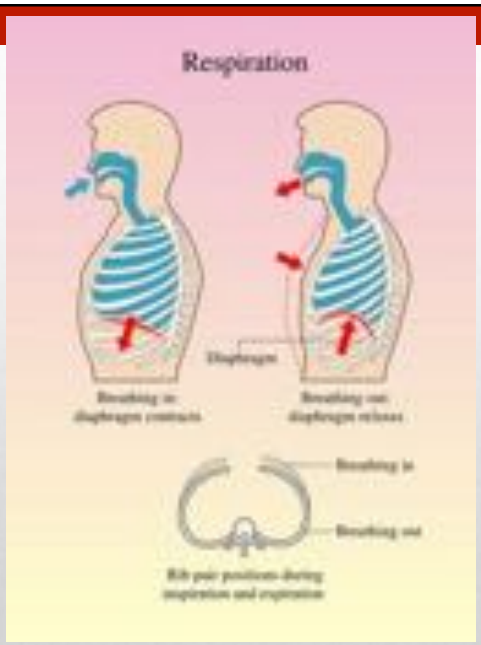
- Resonance is normal
- Dullness over areas of fluid (i.e. pleural effusion)

Auscultation

- Quality of breath sounds
- Volume of air entry
- Inspiration : expiration
- Adventitious sounds: crackles, wheezes, pleural rub, stridor, bronchial breathing



Physical Exam



Physical Exam

Physical Exam – Auscultation points

Acute cough

- Viral or bacterial infection
- Asthma
- Bronchogenic carcinoma

Chronic cough

- Smoking
- Exposure to environmental irritants
- Postnasal drip
- Carcinoma of upper tract
- Thyroid disorders

Cough and sputum production

- Acute bronchitis
- Pneumonia
- TB
- COPD

Dyspnea

- Asthma
- COPD
- Pneumothorax
- Lung cancer

Differential Diagnoses

Hemoptysis

- Bronchitis
- Cystic fibrosis
- TB
- Lung abcess
- Pulmonary Embolism
- Malignancy

Wheeze

- Acute bronchitis
- COPD
- Asthma
- Foreign-body aspiration

Chest pain

- Pneumonia
- Pneumothorax
- Pericarditis
- Fractures of ribs and sternum

Referred pain from gastrointestinal system

Differential Diagnoses

Pulmonary Function Test/ Spirometry

- Diagnostic test done off-site (not done in Nursing Station) – need MD/NP order
- Machine measures how much air is blown out from the lungs and how fast it can be blown out.
- Spirometry is the most reliable way to test for COPD and asthma.

https://youtu.be/rN1udeuPHJ4

Case Discussion

A patient presents with acute cough, sputum production, dyspnea, and wheeze.

What are potential diagnoses of the patient's symptoms?

What are potential diagnoses of the patient's symptoms?

Asthma
Tuberculosis
COPD
Malignancy

Case Discussion

Controlled Asthma	Partly Controlled Asthma
Dyspnea, wheeze, cough ≤2 times weekly	Symptoms >2 times weekly
No limitations to activities	Limited activity
Need for rescue medication <2 times weekly	Need for rescue medication >2 times weekly

Complications of Asthma

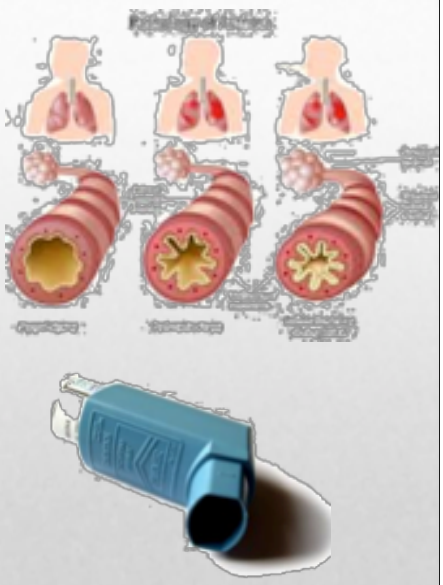
- Severe acute attack: hypoxia, respiratory distress which may progress to respiratory failure, atelectasis, pneumothorax, death
- Chronic: interference with activities of daily living, COPD

Common Conditions: Asthma

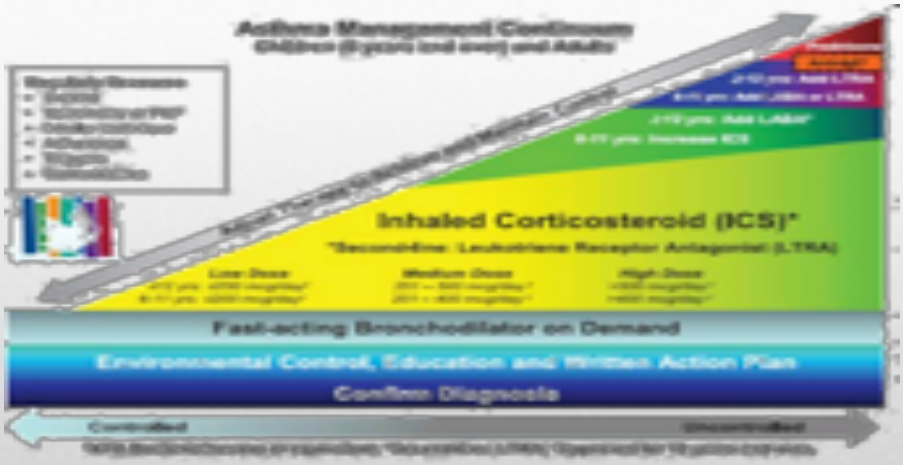
Common Conditions: Asthma

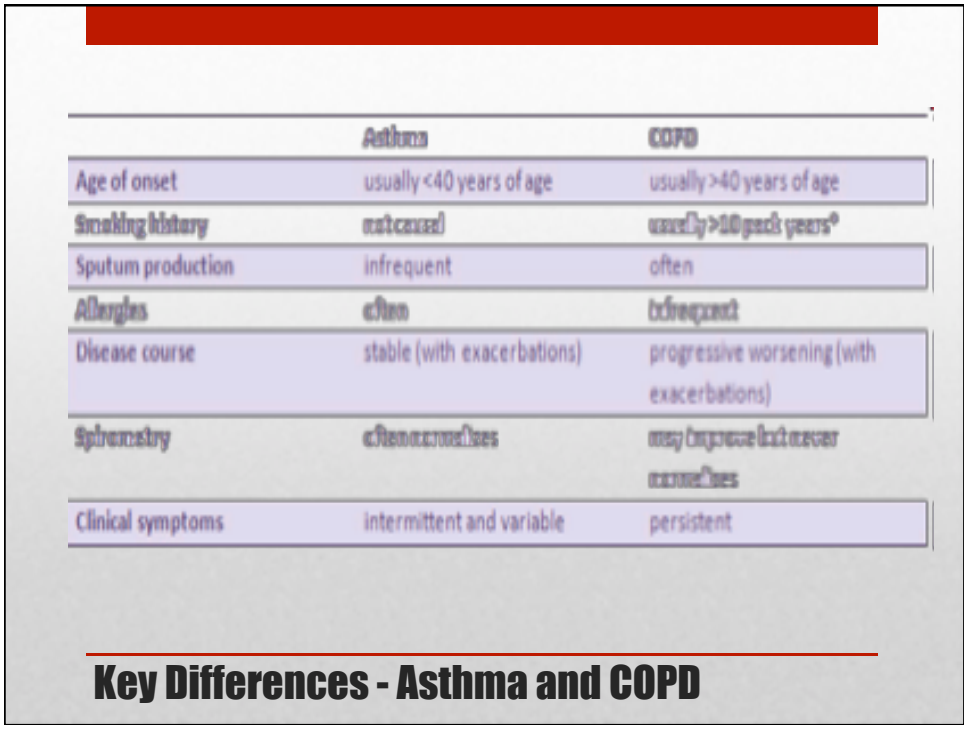
Management

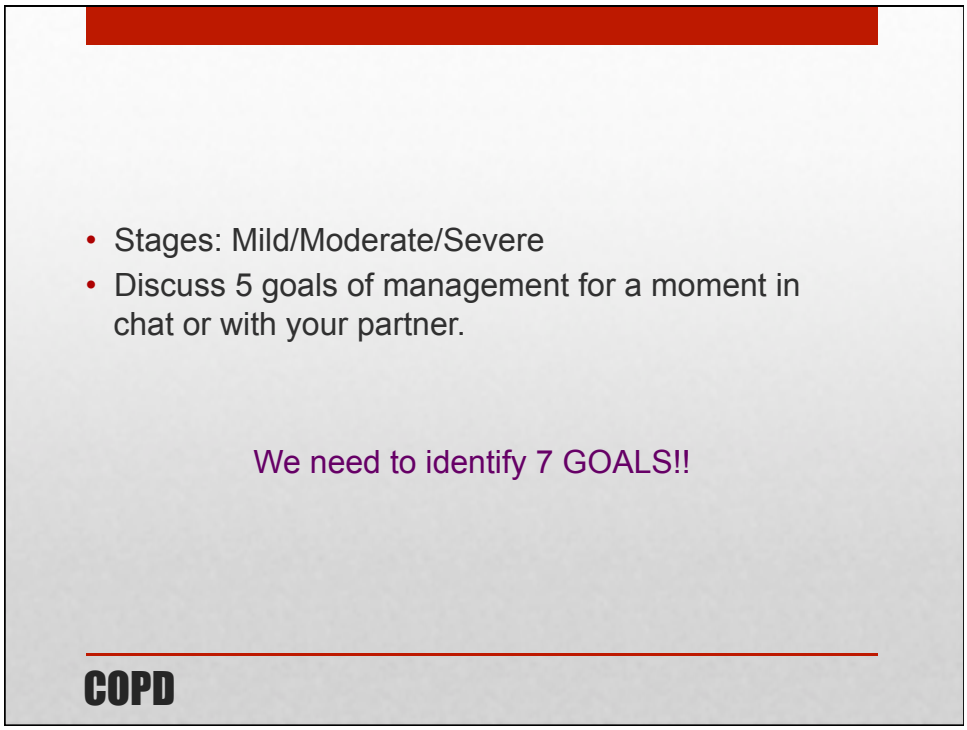
- Avoid environmental allergens, occupational irritants, NSAIDs, and ASA products
- **Inhaled corticosteroids, long-lasting β_2 agonists, short-acting β_2 agonists, oral steroids**
- Follow-up every 3-6 months once stabilized



Controlling Inflammation




Asthma
COPD
Age of onset
usually <40 years of age
usually >40 years of age
Sputum production
infrequent
often
Disease course
stable (with exacerbations)
progressive worsening (with exacerbations)
Clinical symptoms
intermittent and variable
persistent
Key Differences - Asthma and COPD


• Stages: Mild/Moderate/Severe
• Discuss 5 goals of management for a moment in chat or with your partner.
We need to identify 7 GOALS!!
COPD

Asthma – Paediatric Considerations

Triggers

- Allergens
- Exercise
- Cold air
- Cigarette or wood smoke

Physical Findings

- Irritability, anxiety
- Tachycardia
- Tachypnea
- Cough, wheeze, intercostal indrawing

Management

- Inhaled β_2 agonists: *salbutamol (Ventolin)* 100 µg/puff MDI with spacer (AeroChamber)
- 6–10 puffs/dose q20 mins x3 doses;

Practice Tips

- Spirometry testing is a key component of the COPD diagnosis.
- Testing for COPD should be directed towards symptomatic individuals, particularly current or former smokers over the age of 40.
- Clinical features such as smoking history, age of onset, and the persistence or variability of symptoms are important in the diagnostic distinction between asthma and COPD.

Common Conditions:
Community Acquired Pneumonia

Cause:

- *Streptococcus pneumoniae (pneumococcal)* and *Mycoplasma* (among other organisms)

Findings:

- Fever, chills
- Cough
- Sputum (yellow, green, blood tinged)
- Sharp, localized chest pain
- SOB

Management:
(MD/NP consult)

- **No comorbidities** – Erythromycin 2 g PO x 7–10 days
- **With comorbidities** – Azithromycin (Zithromax), 500 mg on day one, then 250 mg po daily for 4 days

Pneumonia

1. Community acquired. Who does that exclude?
2. Do you need an X-ray to treat?
3. How long to you treat?
4. When do you NOT give Pneumo 23 vaccine?
5. Know your common pathogens
   i. Smokers – Haemophilus Influenzae

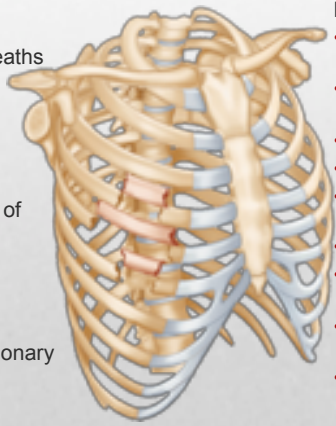
Age	Drug and Dosage
Neonate	Ampicillin, 200 mg/kg/day, divided q6h, IV AND Gentamicin (Garamycin), 4 mg/kg IV q24h
1-4 mo.	Cefuroxime (Ceftin), 150 mg/kg/day IV, divided q 8 hours AND/OR Erythromycin 40 mg/kg/day, PO/IV, divided q6h
4 mo-5 years	Amoxicillin (Amoxil), 40–90 mg/kg/day PO, divided q8h, for 7–10 days
>5 years	Erythromycin 30–50 mg/kg/day, divided q6–8h, PO for 7–10 days (maximum 2 g/day)

* Always consult on sick children.
* Neonates under 3 months need to be medevac'd.

Community Acquired Pneumonia
Paediatric Considerations

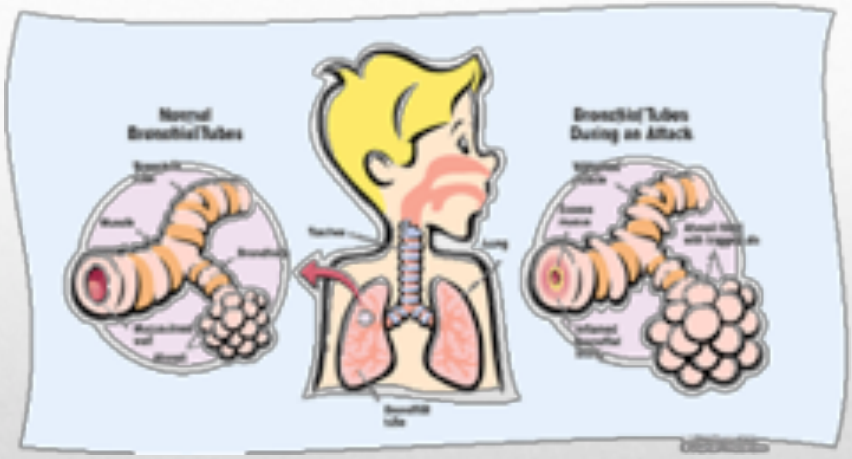
- Unstable segment of the bony chest wall
- Fracture of 3 or more adjacent ribs in at lease 2 places
- Force of trauma also injures underlying tissues (pneumothorax, hemothorax, cardiac tamponade)

Physical Findings:
- Tachycardia
- Tachypnea, shallow breaths
- Normo-Hypotension
- Diaphoresis
- Cyanosis
- Chest wall ecchymosis
- Paradoxical movement of chest wall
- Crepitus may be felt
- Hyper-resonance (pneumothorax)
- Dull (hemothorax, pulmonary contusions)
- Crackles (effusions)



Management:
- Consult Physician and Medevac ASAP
- ABCDE Trauma management
- Ensure adequate ventilation
- Protect C-spine
- Splinting chest wall with pillow
- Provide O2 10-12L/min NRB
- Initiate 2x large bore IV lines with NS
- Replace blood losses then maintenance
- Monitor vital signs (BP, HR, SpO2, Resp)

Emergency Presentation - Flail Chest



History
Onset of illness (sudden vs. gradual)
Symptoms
Fever
Runny nose
Sore throat
Wheeze
Fatigue

Respiratory – Paediatric Considerations

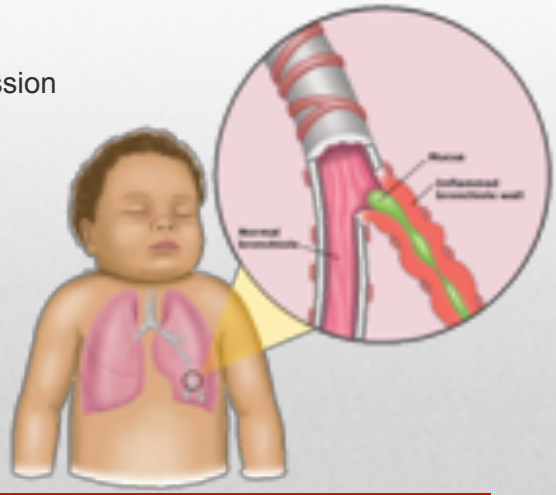
- Results from respiratory infection (e.g. influenza virus, etc.)

Physical Findings:

- Expiratory wheezing
- Hyperresonant to percussion
- Coarse crackles

Differential Diagnosis:

- Viral-triggered asthma
- Pneumonia
- Foreign body aspiration



Bronchiolitis

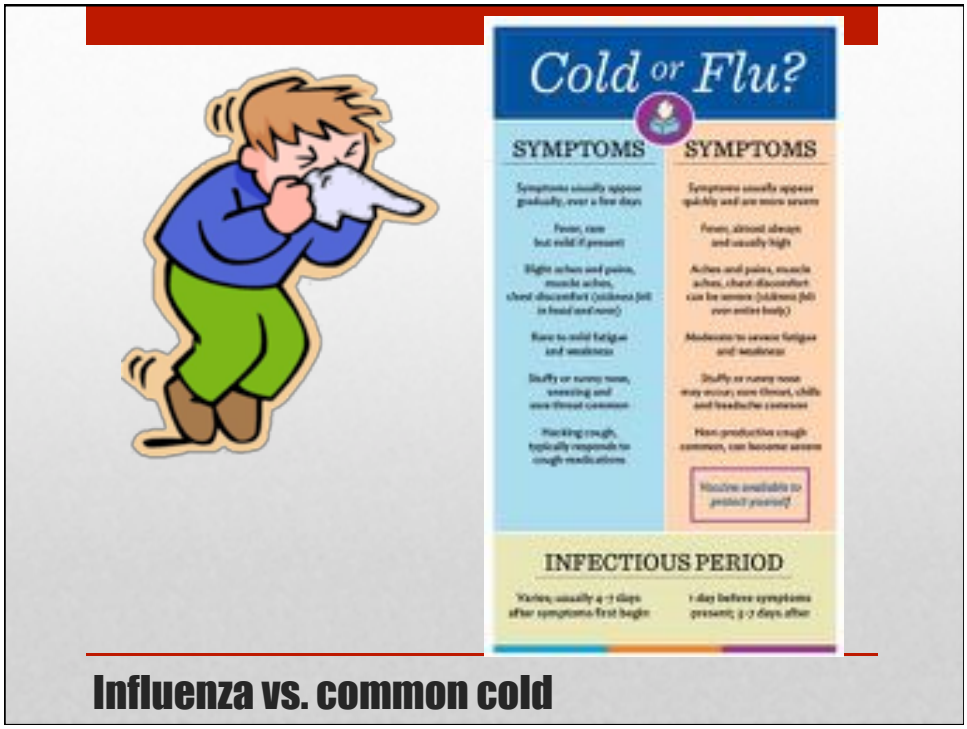
Pharmacologic Management

- **For fever**: acetaminophen (Tylenol), 15 mg/kg PO or PR every 4–6 hours as needed
- **Bronchodilator for wheezing**: salbutamol (Ventolin) 4–10 puffs MDI via spacer with face mask

Bronchiolitis

Entity	Usual Age Range	Mode of Onset of Respiratory Distress
Severe tonsillitis	Late preschool or school age	Gradual
Peritonsillar abscess	Usually > 8 years	Sudden increase in temperature, appears acutely ill, unilateral throat pain, "hot potato" speech
Retropharyngeal abscess	Infancy to adolescence	Fever and appearance of acute illness after URTI, pharyngitis or penetrating injury
Epiglottitis	1–7 years	Acute onset of hyperpyrexia, dysphagia and drooling
Croup	6 months to 4 years	Gradual onset of stridor and barky cough after mild URTI
Foreign-body aspiration	Late infancy to 4 years	Choking episode resulting in immediate or delayed respiratory distress
Bacterial tracheitis	Infancy to 4 years	Moderately rapid onset of fever, appearance of acute illness, respiratory distress

Upper Airway Disorders Comparison


Cold or Flu?
SYMPTOMS
SYMPTOMS
INFECTIOUS PERIOD
Influenza vs. common cold