NURS 821 Alterations in Respiration and Ventilation

Lecture 7

Part 3 Alterations in Diffusion

Alterations in Gas Diffusion

Pneumonia

- Definition-Acute lung infection
- Etiology-viral, bacterial, fungal, GI conent aspiration
  - Most common-Streptococcus (70%), Mycoplasma, Staphylococcus, Klebsiella
- Incidence-population at risk

Pneumococcal Pneumonia

- **Stages**
  - Initial stage-acute inflammatory response
  - Hyperemic stage-congestion and alveolar engorgeent
  - Red hepatization-looks like liver; lung parenchyma consolidation
  - Gray hepatization-increased alveolar leukocytes, fibrin deposit on alveolar surfaces, phagocytosis
  - Resolution –macrophages ingest and clear
  - or regression-full of fibrous exudate

Legionella Pneumonia

- ***Origin***-Outbreak in Philadelphia in 1976
- ***Organism***-Legionella pneumophilia-difficult to grow without ideal conditions
- Minor epidemics relate to contaminated water, e.g. stagnant H2O in AC
- Manifestations-Usually subclinical or 2-10 day incubation followed by flu-like symptoms
  - Dry cough, severe HA, F

Tuberculosis Big Picture

- Annually, 1.9 billion deaths worldwide
- 10-15 million Americans infected, 54 million internationally, not necessarily active disease
- 10-15% of all TB cases; 30% of cases in age 25-44 are in HIV-infected individuals (CDC, 2000)
- 50% of untreated cases die
- Currently, 10-15 million in U.S. and 2.1 billion cases worldwide with disease that could reactivate (CDC, 2000; NIH, 2000).

Tuberculosis

- Tuberculosis is the largest cause of death among all infectious diseases-responsible for 5% deaths worldwide
- Until mid-1980's TB declining in U.S.-
  - 1986 dramatic increase
- 9.6% deaths in 15-59 age group (CDC, 2000; NIH, 2000)

TB Risk Factors

- Immunocompromised
  - HIV
  - CA
  - Immune suppression therapy
  - Very young or old
  - Malnourished-alcohol, malabsorption
  - Chronic illness-renal, hepatic, lung, etc.

TB and HIV (CDC, 2000)

- Cause of death for 1 out of 3 PWA
- 1/3 of increase in TB cases over last 5 years due to HIV epidemic
- HIV infected 100 times greater risk of developing active TB and becoming infectious
- 10-15% all TB; 30% all cases in ages 25-44 occur in HIV-infected persons
- Surge of MDR TB

TB Pathophysiology

- Mycobacterium TB enters body, usually inhaled
  - Deposits in lung periphery-lower upper lobes or upper lower lobes
  - Central lesion core with bacilli surrounded by lymphocytes and fibroblasts; initially neutrophils, later macrophages to form giant cells
  - Ghon complex-diagnostic-initial lesion and lymph node involvement

Pneumoconioses

- Definition-Pulmonary fibrosis or excess fibrin or connective tissue in lung due to chronic exposure to inhaled organic or inorganic substances
- Many forms: asbestosis, chicken farmers' lung, coal miners' lung, hairdressers lung, nail technicians' lung, nurses" ??? Lung, etc.

Sarcoidosis

- ***Definition***-Common systemic inflammatory granulomatous disease, usually initiating in the lungs or lymph nodes
- Etiology-unknown; highest incidence in African American women 20-40
- ***Pathophysiology***-Appearance of granulomas which may regress, but often remain inflamed and become fibrotic

(NHLBI, 2000)

Sarcoidosis Manifestations

- Manifestations-
  - s.o.b.
  - skin rash (erythema nodosum) on face, arms, shins, eyes.
  - wt. loss
  - Fatigue
  - Fever
  - night sweats
  - “unwell”.

Pulmonary Edema-Etiology

- Increased capillary hydrostatic pressure
- Increased capillary permeability
- Lymphatic insufficiency
- Decreased interstitial pressure
- Decreased colloid osmotic pressure
- Inflammation-causes many fluid dynamic changes
- Unknown etiology

Clinical Conditions Resulting in Pulmonary Edema

- Cardiac
- Pulmonary
- Hepatic
- Renal
- Lymphatic

Pulmonary Edema Stages

- Interstitial edema-widens alveolocapillary bed, decreasing gas exchange
- Alveolar edema-high interstitial hydrostatic pressure forces fluid into alveoli causing surfactant washout, decreased surface tension, alveolar collapse, increased work of breathing, severe hypoxemia, hypercapnia, shunting, VQ abnormalities