Interferences with Ventilation

Upper Respiratory Infections & Conditions

Interferences with Ventilation
Behavioral Objectives

- Describe clinical manifestations, causes, therapeutic interventions, & nursing management of patients with upper & lower respiratory infections
  - Allergic rhinitis & sinusitis, influenza, otitis media, pharyngitis, tonsillitis, croup, pneumonia, tuberculosis
- Discuss communicable diseases – causative agents, clinical manifestations, medical & nursing management, immunization schedule
  - Diphtheria, Pertussis, Measles, Mumps, Chicken Pox
  - AIDS

Interferences with Ventilation
Allergic Rhinitis

- Reaction of the nasal mucosa to a specific allergen.
  - Seasonal
  - Environmental triggers – molds, dust mites, pet dander

- **Clinical Manifestations**:
  - Nasal congestion, sneezing, watery, itchy eyes & nose,
  - Nasal turbinates – pale, boggy, edematous
  - Chronic exposure: headache, congestion, pressure, postnasal drip, nasal polyps
  - Cough, hoarseness, recurrent throat clearing, snoring

Interferences with Ventilation
Allergic Rhinitis

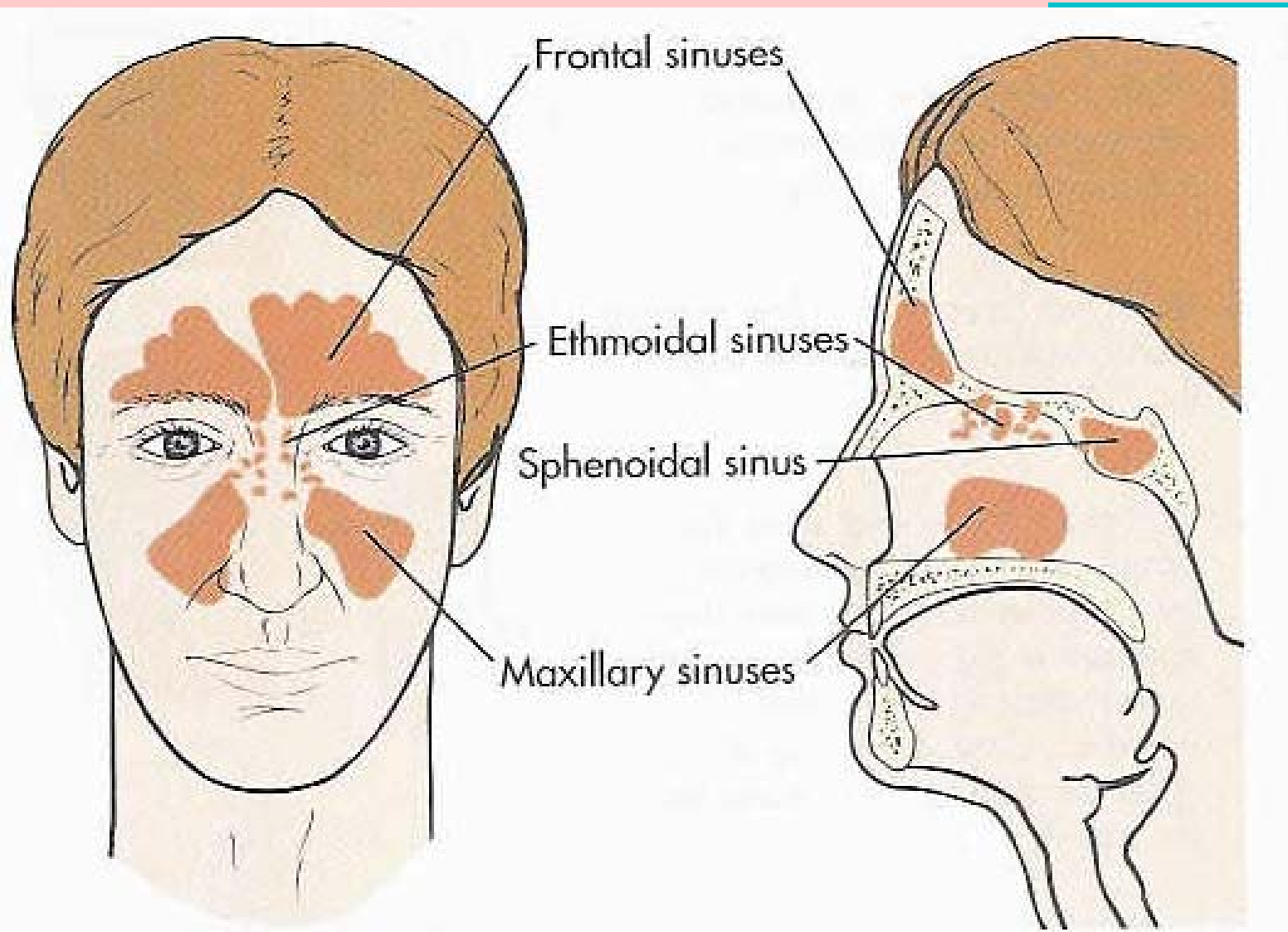
- **Medical Management**
  - Avoidance is the best treatment
    - House dust, dust mites, mold spores, pollens, pet allergens, smoke
  - Medications: nasal sprays, antihistamines, decongestants
    - Nasal corticosteroid sprays – decrease inflammation
      - Local with little systemic absorption
    - Antihistamines
      - First-generation: sedative side effectives
      - Second-generation: less sedation, increase cost
  - Nasal decongestants – short duration; long term causes rebound effect
  - Immunotherapy – “allergy shots” – controlled exposure to small amounts of a known allergen through frequent injections

Interferences with Ventilation

Sinusitis

- Develops when the ostia (exist) from the sinuses is narrowed or blocked by inflammation or hypertrophy
  - Secretions accumulate behind the obstruction
    - Rich medium for growth of bacteria
    - Most common infections:
      - **Bacterial: Streptococcus pneumoniae, Haemophilus influenzae, or Moraxella catarrhalis**
      - **Viral: Penetrate mucous membrane & decrease ciliary transport**

Interferences with Ventilation
Sinus Locations



Interferences with Ventilation
Acute Sinusitis

- Results from upper respiratory infection (URI), allergic rhinitis, swimming, or dental manipulation
  - All cause inflammatory changes & retention
  - Clinical Manifestation: pain over the affected sinus, purulent nasal drainage, nasal obstruction, congestion, fever, malaise, headaches
  - Clinical Findings: Hyperemic & edematous mucosa, enlarged turbinates, & tenderness over the involved sinuses. Sinusitis may trigger asthma
  - Treatment: antibiotics (10 - 14 days), decongestants, nasal corticosteroids, mucolytics, non-sedating antihistamines; hydration, hot showers, no smoking, environmental control of allergens

Interferences with Ventilation
Chronic Sinusitis

- Persistent infection usually associated with allergies and nasal polyps.
  - Results from repeated episodes of acute sinusitis – loss of normal ciliated epithelium lining the sinus cavity
  - Diagnosis: X-ray or CT – confirm fluid levels & mucous membrane thickening
  - Mixed bacteria flora are present – difficult to eliminate
    - Broad-spectrum antibiotics – 4 to 6 weeks
    - Nasal endoscopic surgery to relieve blocked or correct septal deviation.

Interferences with Ventilation

Rhinoplasty

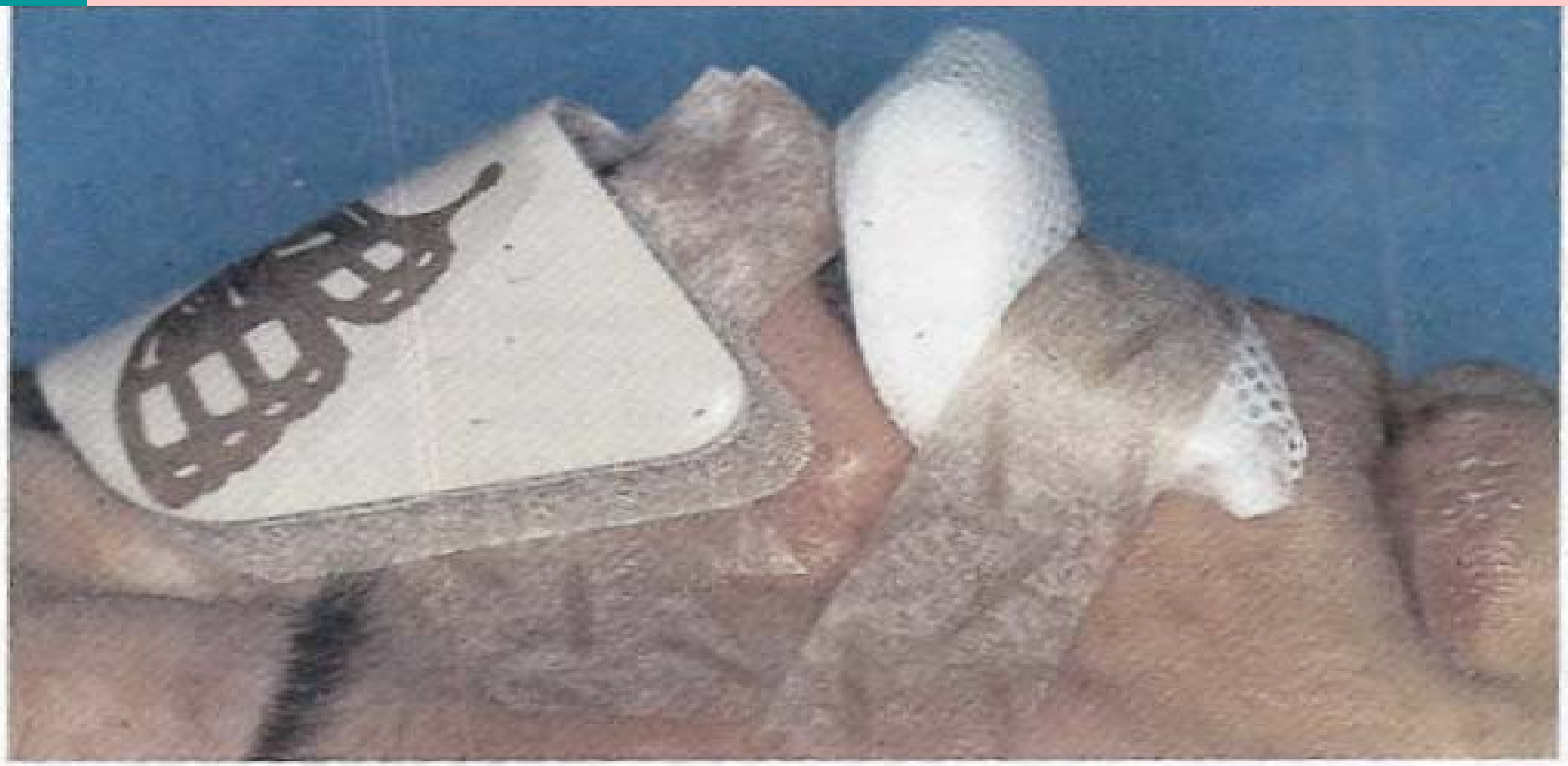


Figure 29-1 ● Immediate postoperative appearance of a client who has undergone rhinoplasty. Note the splint and gauze drip pad (moustache dressing). (From Tardy, M.E. [1997]. *Rhinoplasty: The art and science*. Philadelphia: W.B. Saunders. Used with permission.)

Interferences with Ventilation
Influenza

- Flu-related deaths in US – average 20,000 per year
  - Persons >60 years with heart or lung disease
  - Prevented with vaccination of high risk groups
  - Three Groups of Influenza -- A, B & C
    - Viruses have remarkable ability to change over time
    - Widespread disease & need for annual vaccination
- Clinical Manifestations: Abrupt onset of cough, fever, myalgia, headache, sore throat
- Physical Signs: minimal with normal breath sounds
  - Uncomplicated cases – resolve within approx 7 days
- Complications: Pneumonia
  - dyspnea & rales - Tx: antibiotics

Interferences with Ventilation
Influenza

- **Medical Management Goals**:
  - Prevention: vaccine 70-90& effective – mid-Oct
    - Contraindication: hypersensitivity to eggs
- **Nursing Management Goals**:
  - **Supportive** – relief of symptoms & prevention of secondary infection
    - Rest, hydration, antipyretics, nutrition, positioning, effective cough & deep breathing, handwashing
    - Medications to decrease symptoms:
      - **Oral rimantadine (Flumadine) or amantadine (Symmetrel) –**
      - **Zanamivir (Relenza) & oseltamivir (Tamiflu) – neuraminidase inhibitors prevent the virus from budding & spreading – shorten the course of influenza**

Interferences with Ventilation
Otitis Media

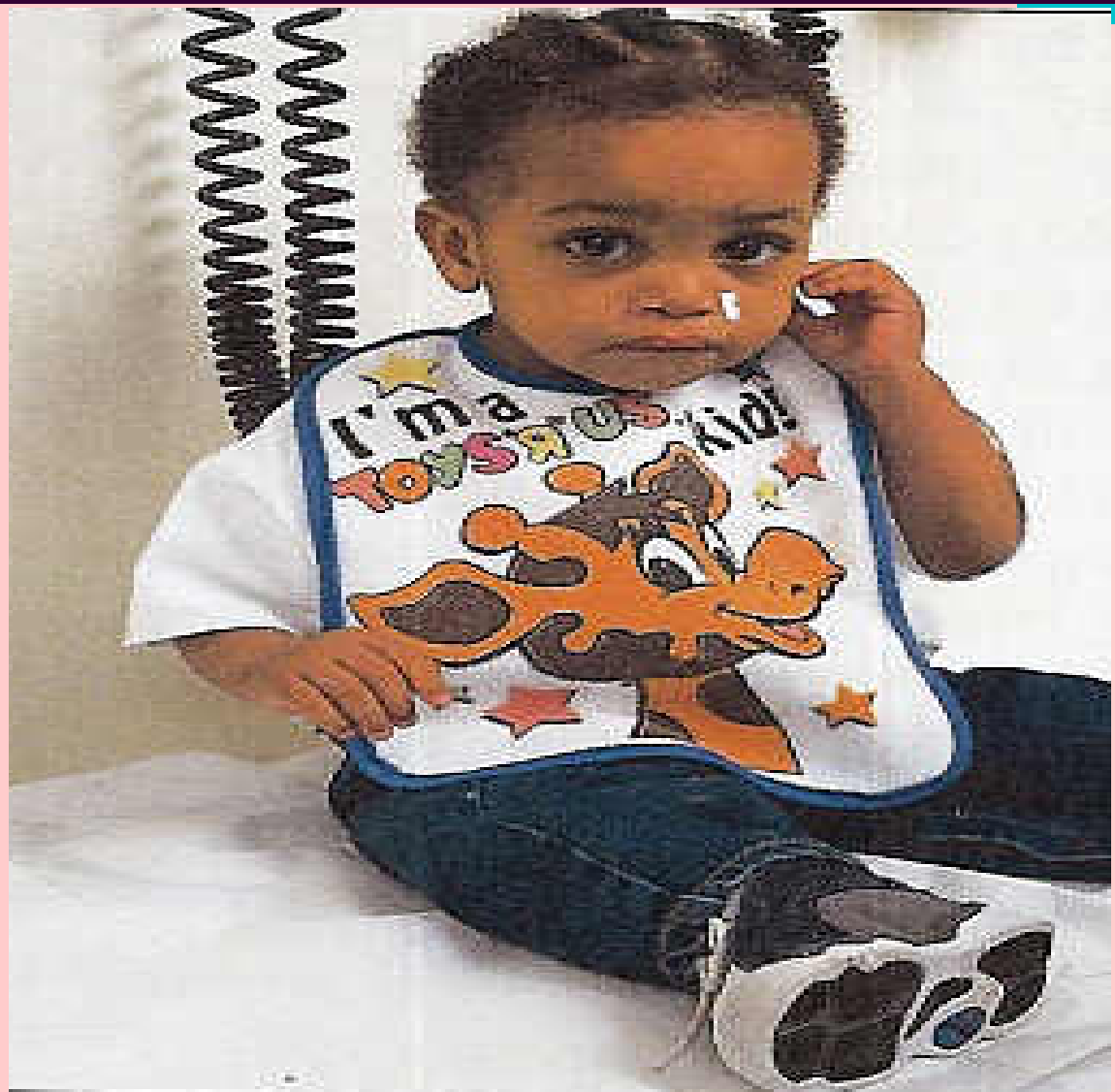
- **Inflammation of the middle ear – sometimes accompanied by infection**
  - 75-95% of children will have 1 episode before the age of 6 years
  - Peak incidence 2 years of age
  - Occurs more frequently in boys
  - More frequently in the winter months
- **Cause: unknown**
  - Related to eustachian tube dysfunction
  - Preceded by URI – edematous mucous membranes of eustachian tube
  - Blocked air flow to the middle ear
  - Air in the middle ear is reabsorbed into the bloodstream
  - Fluid is pulled from the mucosal lining into the former air space
  - Fluid behind the tympanic membrane -- medium for pathogen growth
  - Causative organisms: Strep pneumoniae, H influenzae, Moraxella catarrhalis
  - Enlarged adenoids or edema from allergic rhinitis
  - Children with facial malformations (cleft palate) & genetic conditions (Down syndrome) have compromised eustachian tubes
  - Children living in crowded conditions, exposed to cigarette smoke, attend child care with multiple children

Interferences with Ventilation
Otitis Media

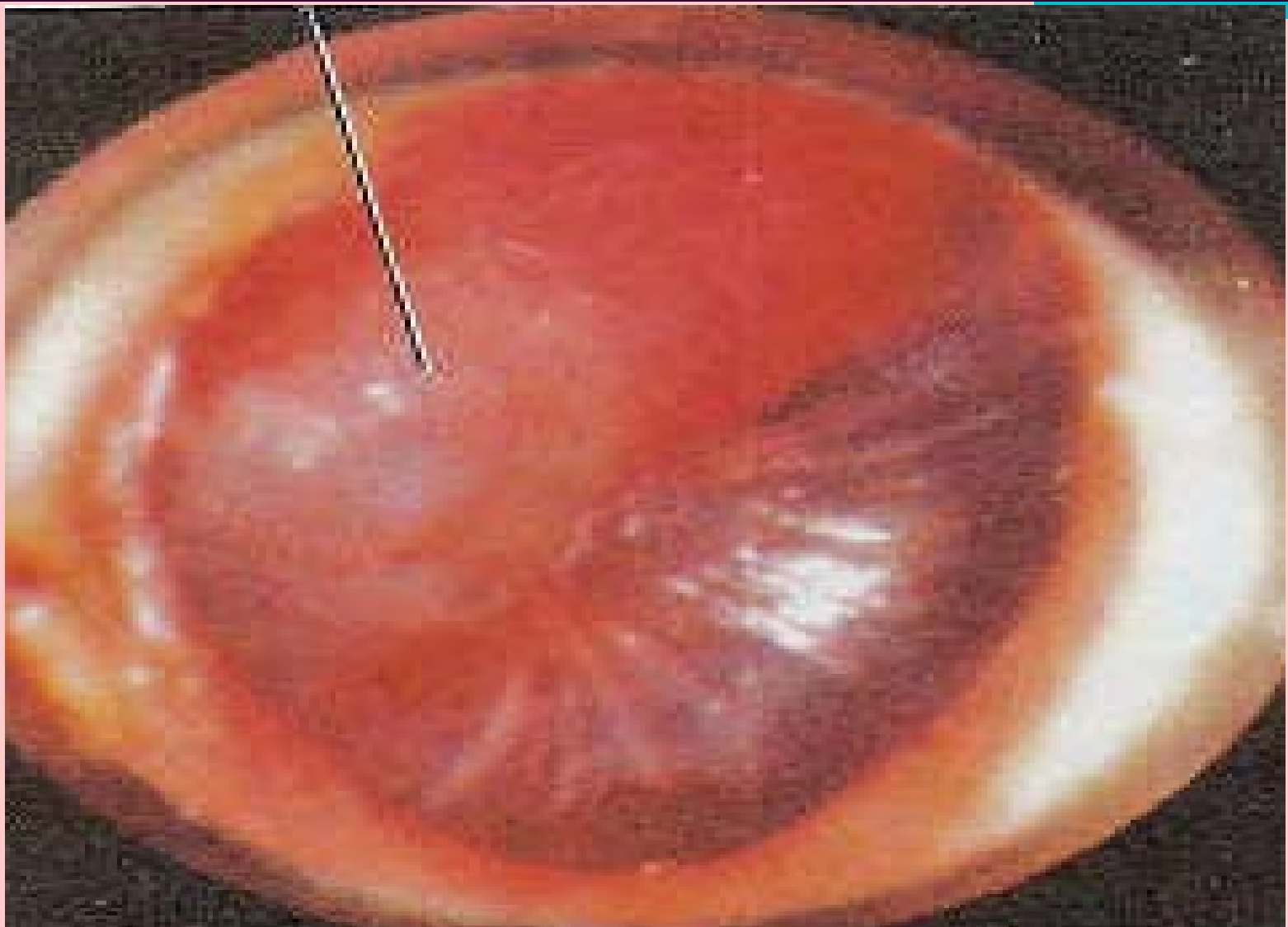
- **Clinical Manifestations**:
  - Categorized according to symptoms & length of time the condition has been present
    - Pulling at the ear – sign of ear pain
    - Diarrhea, vomiting, fever
    - Irritability and “acting fussy” – signs of related hearing impairment
    - Some children are asymptomatic
    - Red, bulging nonmobile tympanic membrane
    - Fluid lines & air bubbles visible—otitis media with effusion
    - Flat tympanogram – loss of the ability of the middle ear to transmit sound

Interferences with Ventilation

Otitis Media



Acute Otitis Media



Chronic Otitis Media with Effusion

Interferences with Ventilation
Otitis Media

- **Treatment:**
  - Traditional: 10 -14 day course of antibiotics – Amoxicillin
    - cefuroxime (Ceftin) - second line drugs
    - ceftriaxone (Rocephin) – used if other drugs are not successful
  - **Concern: increasing drug-resistant microbials**
    - Causative agent not usually known
    - Broad spectrum antibiotics are used – microbial overgrowth
  - **Cautious approach**:
    - Delayed treatment with antibiotics
    - Dosing with antibiotic for 5 - 7 days
  - Audiology followup for chronic otitis media with effusion to check for sensorineural or conductive hearing loss

Interferences with Ventilation
Otitis Media

- **Surgical Treatment: - outpatient procedures**
  - **Myringotomy – surgical incision of the tympanic membrane**
  - **Tympanostomy tubes – pressure-equalizing tubes (PE tubes)**
    - **Used in children with bilateral middle ear effusion & hearing deficiency >20 decibels for over three months**
- **Nursing Management**:
  - Assess: Airway assessment as child recovers from anesthesia, ear drainage, ability to drink fluids & take diet, VS & pulse ox;
  - Nursing Action: Fluids, acetaminophen for pain/discomfort & fever
  - Family Education: Postop instructions; ear plugs—prevent water from getting into the ears; report purulent drainage; be alert for tubes becoming dislodged & falling out

Interferences with Ventilation
Pharyngitis

- Acute inflammation of the pharyngeal walls
  - May include tonsils, palate, uvula
  - Viral – 70% of cases;
  - Bacterial – b-hemolytic streptococcal 15-20% of cases
  - Fungal infection – candidiasis – from prolonged use of antibiotics or inhaled corticosteroids or immunosuppressed patients or those with HIV
- Clinical Manifestations: scratchy throat to severe pain with difficult swallowing; red & edematous pharynx; patchy yellow exudate
  - Fungal: white irregular patches
  - Diphtheria – gray-white false membrane "pseudomembrane" covering oropharynx, nasopharynx & laryngopharynx
- Treatment Goals: infection control, symptomatic relief, prevention of secondary infection/complications
  - Cultures or rapid strep antigen test – establish cause & direct tx
  - Increase fluid intake—cool bland liquids;
  - Candida infections; swish & swallow - Mycostatin

Interferences with Ventilation
Viral Pharyngitis vs. Strep Throat

Viral Pharyngitis	Strep Throat
Nasal congestion	**Tonsillar exudate**
Mild sore throat	**Painful cervical adenopathy**
Conjunctivitis	Abdominal pain
Cough	**Vomiting**
Hoarseness	**Severe sore throat**
Mild pharyngeal redness	Headache
Minimal tonsillar exudate	**Petechial mottling of the soft palate**
Mildly tender anterior cervical lymphadenopathy	Fever > 101F
Fever > 101F	

Interferences with Ventilation

- **A pt. complains of a “sore throat”, pharyngitis pan, temp of 101.8^{o}F, scarlatiniform rash, and a positive rapid test throat culture. The pt. will most likely be treated for which type of infection?**

  A. Staphylococcus

  B. Pneumococcus

  C. Streptococcus

  D. Viral Infection

Interferences with Ventilation
Tonsillitis / Peritonsillar Abscess

- Complication of pharyngitis or acute tonsillitis
  - Bacterial infection invades one or both tonsils
- **Clinical Findings**:
  - Tonsils may be enlarged sufficiently to threaten airway patency
  - High fever, leukocytosis & chills
- **Treatment**:
  - Need aspiration / Incision & drainage of abscess (I&D)
  - Intravenous antibiotics
  - Elective tonsillectomy after infection subsides

Interferences with Ventilation
Tonsillitis / Peritonsillar Abscess

- **Postoperative Care Nsg Dx**
  - Pain, related to inflammation of the pharynx
  - Risk for fluid volume deficit, related to inadequate intake & potential for bleeding
  - Risk for ineffective breathing pattern
  - Impaired swallowing
  - Knowledge deficit, related to postoperative home care

- **Pain relief:**
  - Cool fluids, gum chewing – avoid citrus juice – progress to soft diet
  - Salt water 0.5 t /baking soda 0.5t in 8 oz water – gargles
  - Ice collar
  - Viscous lidocaine swish & swallow
  - Acetaminophen elixir as ordered
  - Avoid vigorous activity

Interferences with Ventilation
Tonsillitis / Peritonsillar Abscess

- **Postoperative care -- Complication prevention**
  - **Bleeding** – first 24 hours or 7 - 10 days postop
    - No ASA or ibuprofen
    - Report any trickle of bright red blood immediately
  - **Infection**
    - Acetaminophen for temp 101F
    - Report temp >102
    - Throat will look white and have an odor for 7 - 8 days postop with low grade fever – not signs of infection

Interferences with Ventilation
Croup Syndromes

- Broad classification of upper airway illnesses that result from swelling of the epiglottis and larynx
  - Swelling extends into the trachea and bronchi
- **Viral syndromes**:
  - Spasmodic laryngitis (croup)
  - Laryngotracheitis
  - Laryngotracheobronchitis (LTB) (croup)
- **Bacterial syndromes**:
  - Bacterial tracheitis
  - Epiglottitis

Interferences with Ventilation
Croup Syndromes

- **Big Three**:
  - **LTB / Epiglottitis / Bacterial tracheitis**
    - Affect the greatest number of children across all age groups in both sexes
    - Initial symptoms:
      - **Stridor – high-pitched musical sound – airway narrowing**
      - **Seal-like barking cough**
      - **Hoarseness**
    - LTB – most common disorder
    - Epiglottis & bacterial tracheitis – most serious

Interferences with Ventilation
Croup Syndromes - LTB

- **LTB – acute viral**
  - 3 mos to 4 years of age – can occur up to 8 years
  - Boys more than girls
  - Concern for airway obstruction in infants < 6 years
  - Causative organism: parainfluenza virus type I, II, or III – winter months in cluster outbreaks
- **Clinical Manifestations**: Ill for 2+ days with URI, cough, hoarseness, tachypnea, inspiratory stridor, seal-like barking cough
- **Treatment Goals**: Maintain airway patency; maintain oxygen saturation within normal range

Interferences with Ventilation
Croup Syndromes

- **Assess: VS, pulse oximetry, respiratory effort, airway, breath sounds, responsiveness, child's ability to communicate reliably**
  - **Noisy breathing – verifies adequate energy stores**
  - **Quiet shallow breathing or < breath sounds – depleted energy stores**

- **Nsg Action: Medication – acetaminophen, aerosolized beta-agonists (albuterol); antibiotics to treat bacterial infection or secondary infection; nebulized corticosteroids; supplemental humidified oxygen to maintain O2 Sat > 94%; increased po & IV fluids; position of comfort; airway resuscitation equipment & staff; airway maintenance with suctioning as needed**

- **Family Education: Medication—expected response; return if symptoms do not improve after 1 hr of humidity & cool air tx or child's breathing is labored and rapid; fluids; position of comfort**

Interferences with Ventilation
Croup Syndromes - Epiglottis

- Also known as supraglottitis – inflammation of the long narrow structure that closes off the glottis during swallowing
  - Edema can occur rapidly & obstruct the airway by occluding the trachea
  - Consider potentially life-threatening

- Cause: bacterial –strep; staph; H influenzae type B (in unimmunized children)

- Clinical Manifestations: High fever, dysphonia –muffled, hoarse or absent voice, dysphagia; increasing drooling—painful to swallow; child sits up and leans forward with jaw thrust "sniffing" – refuses to lie down; laryngospasm – airway obstruction

- Treatment: Endotracheal intubation or tracheostomy; antibiotics; antipyretics; humidified oxygen; airway management; include parents in care

Interferences with Ventilation
Critical Points -- LTB and Epiglottitis

- **Throat cultures and visual inspection of the inner mouth and throat are contraindicated in children with LTB and Epiglottis
  - **Can cause laryngospasms spasmodic vibrations that close the larynx**

- ****Assessment: child requires continuous observation for inability to swallow, increasing degree of respiratory distress, and acute onset of drooling**

****The quieter the child,**

the greater the cause for concern

Interferences with Ventilation
Croup Syndromes – Bacterial Tracheitis

- Secondary infection of the upper trachea after viral laryngotracheitis – Group A Strep or H influenzae
  - Often misdiagnosed for LTB

- **Clinical Manifestation**: Croupy cough; stridor; high fever > 102F for several days; child prefers to lie flat to conserve energy

- **Treatment**: 10-day course of antibiotics to treat + blood cultures

	Acute Spasmodic Laryngitis (Spasmodic Croup)	*Laryngotracheitis*	*Laryngotracheo-bronchitis*	*Bacterial Tracheitis*	*Epiglottitis (Supraglottitis)*
Severity	Least serious	Most common[a]	Most serious; progresses if untreated	Guarded; requires close observation	Most life threatening (medical emergency)[a]
Age affected	3 months to 3 years	3 months to 8 years	3 months to 8 years	1 month to 13 years[a]	2 years to 8 years
Onset	Abrupt onset; peaks at night, resolves by morning (recurs)[a]	Gradual onset; starts as URI, progresses to moderate respiratory difficulty	Gradual onset; starts as URI, progresses to symptoms of respiratory distress	Progressive from URI (1–2 days)	Progresses rapidly (hours)[a]
Clinical manifestations	Afebrile; mild respiratory distress; barking-seal cough	*Early:* mild fever [<39.0°C (102.2°F)]; hoarseness; barking-seal, brassy, croupy cough; rhinorrhea; sore throat; stridor; apprehension (inspiratory) *Progressing to* labored respirations	*Early:* mild fever; [<39.0°C (102.2°F)]; barking-seal, brassy, croupy cough; rhinorrhea; sore throat; stridor (inspiratory); apprehension; restless/irritable *Progressing to* retractions (progressive); increasing stridor; cyanosis	High fever [>39.0°C (102.2°F)]; URI appears as viral croupy cough; croup initially; stridor (tracheal); purulent secretions	High fever [>39.0°C (102.2°F)]; URI; intense sore throat; dysphagia[a]; drooling[a]; increased pulse and respiratory rate; prefers upright position (tripod position with chin thrust)[a]
Etiology	Unknown; suspect viral with allergic/emotional influences	Parainfluenza, types I and II, RSV, or influenza	Parainfluenza, types I and II, RSV, or influenza	*Staphylococcus*	*Haemophilus influenzae*

Interferences with Ventilation
Pneumonia

- **Acute inflammation of lung parenchyma**
- **Causes**: bacteria, viral, Mycoplasma, fungi, parasites, and chemicals
- **Classification**:
  - By causative organism
  - By community-acquired or hospital-acquired

Organisms Associated with Pneumonia

COMMUNITY-ACQUIRED PNEUMONIA	HOSPITAL-ACQUIRED PNEUMONIA
*Streptococcus pneumoniae**	*Pseudomonas aeruginosa*
Mycoplasma pneumoniae	*Enterobacter*
Haemophilus influenzae	*Escherichia coli*
Respiratory viruses	*Proteus*
Chlamydia pneumoniae	*Klebsiella*
Legionella pneumophila	*Staphylococcus aureus*
Oral anaerobes	*Streptococcus pneumoniae*
Moraxella catarrhalis	Oral anaerobes
Staphylococcus aureus	
Nocardia	
Enteric aerobic gram-negative bacteria (e.g., *Klebsiella*)	
Fungi	
Mycobacterium tuberculosis	

Interferences with Ventilation
Pneumonia

- **Community-acquired (CAP):**
  - Lower respiratory tract infection with onset in the community or within first two hospital days
    - 6.5 million/year 1.5 million hospitalized
    - 6th leading cause of death in US
    - Causative agent identified only 50% of the time
    - Modifying risk factors: 65+ years, alcoholism, multiple medical comorbidities, & immunosuppressed patients

Interferences with Ventilation
Pneumonia

- **Hospital-Acquired (HAP):**
  - Rate of 5-10 cases per 1000 hospital admissions
  - Increases 6-20x in the intubated pt on a ventilator

Interferences with Ventilation
Pneumonia

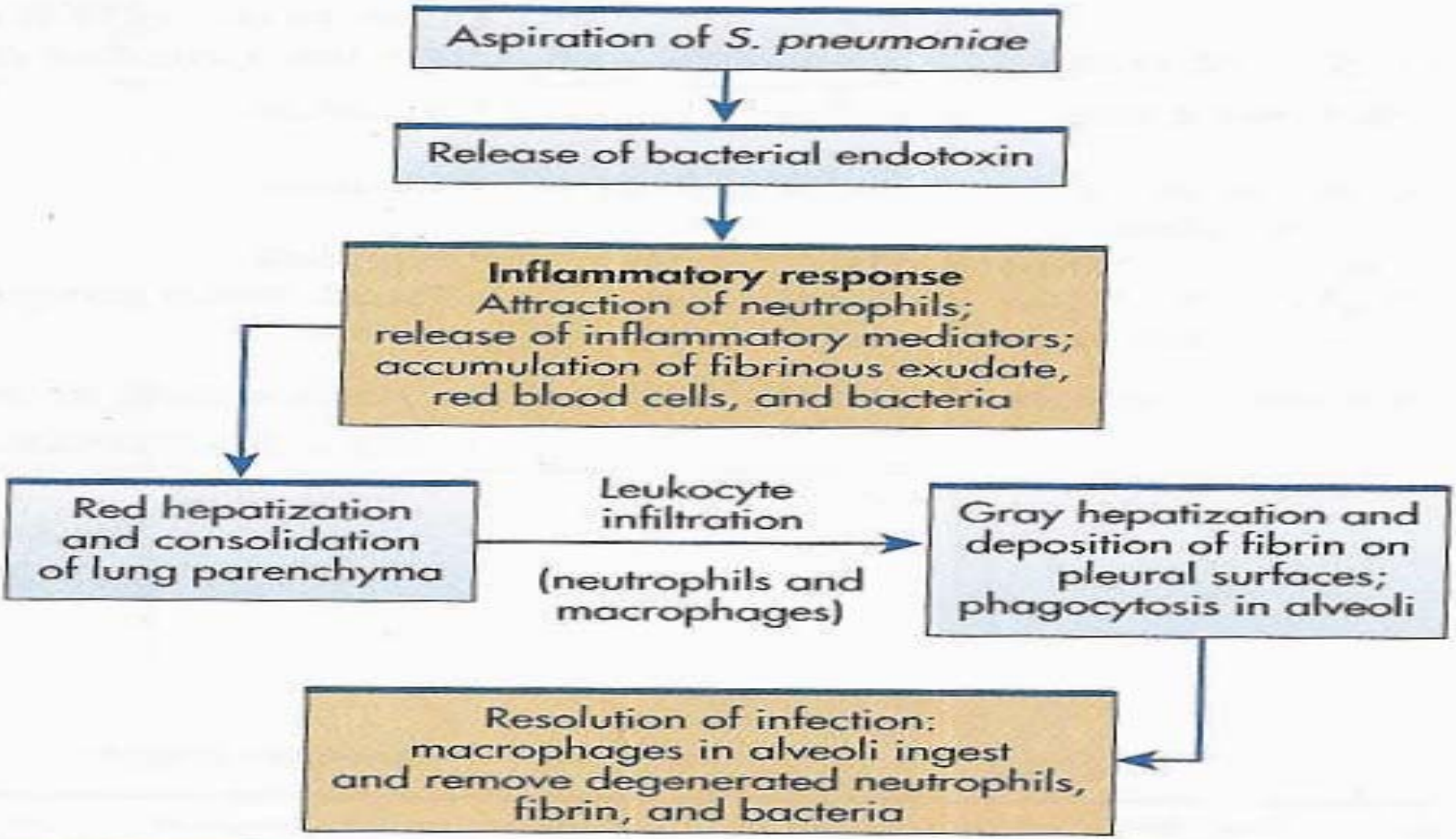
- **Aspiration Pneumonia**:
  - Sequelae from abnormal entry of secretions or substances into the lower airway
    - Patient with history of loss of consciousness, dysphagia, CVA, alcohol intake, seizure, anesthesia, depressed cough and gag reflex, tube feeding complication

- **Three forms of aspiration:**
  - Inert substance (e.g., barium) – **mechanical** obstruction
  - Toxic fluids (e.g., gastric juices) – **chemical injury with secondary infection**
  - **Bacterial infection** (e.g., oropharyngeal organisms) – **primary infection**

Interferences with Ventilation Pathophysiology

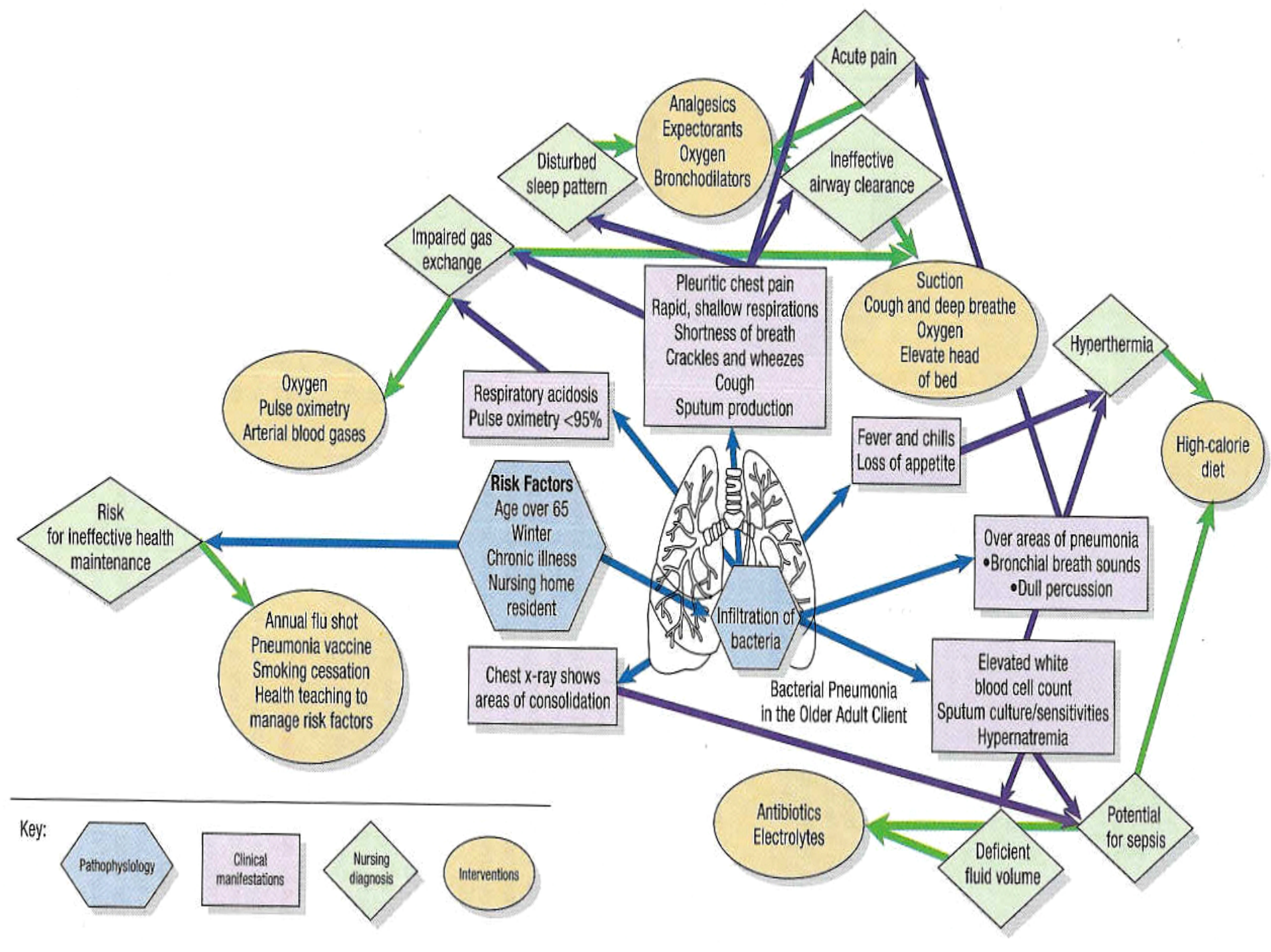
- **Pneumococcal Pneumonia** – most common cause of bacterial pneumonia
  - **Congestion** – increased fluid in alveoli
    - Organisms multiply
  - **Red hepatization** – Massive dilatation of capillaries & alveoli
  - **Gray hepatization** – Blood flow decreases; leukocytes & fibrin consolidate in the affect part of the lung
  - **Resolution** –
    - macrophage lyse exudate
    - healing process
    - normal lung tissue is restored

Interferences with Ventilation
Pneumonia -- Pathyphysiology



Interferences with Ventilation
Pneumonia – Clinical Manifestations

- **Constellation of typical signs & symptoms**:
  - Fever, chills, cough productive of purulent sputum, pleuritic chest pain (in some cases)
  - Physical Exam: pulmonary consolidation—dullness to percussion, increased fremitus, adventitious breath sounds—rales/crackles, rhonchi, wheeze
- **Atypical signs and symptoms: (often viral origin)**
  - Gradual onset – myalgias, headache, fatigue, sore throat, nausea, vomiting, diarrhea; nonproductive cough, breath sounds—rales
  - May occur secondary to influenza, measles, varicella-zoster, & herpes simplex


Acute pain
Analgesics
Expectorants
Oxygen
Bronchodilators
Disturbed sleep pattern
Ineffective airway clearance
Impaired gas exchange
Pleuritic chest pain
Rapid, shallow respirations
Shortness of breath
Crackles and wheezes
Cough
Sputum production
Suction
Cough and deep breathe
Oxygen
Elevate head of bed
Hyperthermia
Oxygen
Pulse oximetry
Arterial blood gases
Respiratory acidosis
Pulse oximetry <95%
Fever and chills
Loss of appetite
High-calorie diet
Risk Factors
Age over 65
Winter
Chronic illness
Nursing home resident
Risk for ineffective health maintenance
Over areas of pneumonia
•Bronchial breath sounds
•Dull percussion
Annual flu shot
Pneumonia vaccine
Smoking cessation
Health teaching to manage risk factors
Infiltration of bacteria
Chest x-ray shows areas of consolidation
Bacterial Pneumonia in the Older Adult Client
Elevated white blood cell count
Sputum culture/sensitivities
Hypernatremia
Antibiotics
Electrolytes
Potential for sepsis
Deficient fluid volume
Key:
Pathophysiology
Clinical manifestations
Nursing diagnosis
Interventions

Interferences with Ventilation
Complications of Pneumonia

- Developed in patients with underlying chronic diseases
  - Pleurisy – inflammation of the pleura
  - Pleural Effusion –
  - Atelectasis –alveolar collapse
  - Delayed resolution – 4+ weeks
  - Lung abscess (usually staph aureus)
  - Empyema – purulent exudate in the pleural cavity
  - Pericarditis
  - Arthritis
  - Meningitis

Interferences with Ventilation
Pneumonia – Diagnostic Studies

- **Chest x-ray** –
  - Bacterial: Lobar or segmental consolidation
  - Viral or Fungal: Diffuse pulmonary infiltrates
- **Sputum Culture & Sensitivity**
  - Prior to initiating antibiotic therapy
- **Arterial Blood Gas Analysis**
- **CBC**

Interferences with Ventilation
Pneumonia – Medical Management

- **Treat underlying cause** –
  - Bacterial: PO or IV antibiotic therapy – based on sensitivity
    - azithromycin (Zithromax), clarithromycin (Biaxin),
  - Viral: antiviral therapy
- **Improve ventilation** – oxygen therapy
- **Prevention**: Pneumococcal vaccine for "at risk" Pt:
  - Chronic illnesses – heart, lung, diabetes mellitus
  - 65+ years
  - Recovering from a severe illness
  - Resides at long-term care facility
  - Once per life time; q5 years for immunosuppressed pt.

Interferences with Ventilation
Pneumonia – Nursing Management

- **Assess**: Total health assessment: Respiratory: breath sounds – adventitious sounds; respiration rate & quality, pulse oximetry: tachypnea, dyspnea, orthopnea, use of accessory muscles; assess ability to swallow; color, consistency, amount of sputum; CV: heart rate & rhythm; Neurologic: mental status—changes; lab results; x-ray

- **Nsg Action**: Hydration: PO and IV fluids 3L/day; Humidity—respiratory treatments; oxygen therapy; position of comfort; rest; chest PT & postural drainage; Airway management & support; nutrition – 1500 calories/day – small frequent meals

- **Pt. Education**: Health Promotion – nutrition--eating habits; hygiene; avoid exposure to people with URI; vaccination; medication adherence

Interferences with Ventilation

- **An essential diagnostic test for pneumonia in the older adult is which of the following tests?**
  - A. Pulse oximetry because of the older adult's normal decreased lung compliance
  - B. Sputum specimen for accuracy of antibiotics to decrease risk of renal failure
  - C. Elevated white blood cell countconforming findings of pleuritic chest pain, chills,fever, cough, and dyspnea
  - D. Chest x-ray because assessment findings can be vague and resemble other problems

Interferences with Ventilation

- A client is admitted to the hospital with the Dx of pneumonia. The nurse would expect the chest x-ray results to reveal which of the following?
  - A. Patchy areas of consolidation
  - B. Tension pneumothorax
  - C. Thick secretions causing airway obstruction
  - D. Stenosed pulmonary arteries

Interferences with Ventilation

- **For most hospitalized clients, prevention of pneumonia is accomplished by which of the following nursing interventions?**
  - **A. Monitoring chest x-rays for early signs of pneumonia**
  - **B. Monitoring lung sounds every shift and forcing fluids**
  - **C. Teaching the client coughing and deep breathing exercises and incentive spirometry**
  - **D. Ensuring respiratory therapy treatments are being performed every 4 hours**

Interferences with Ventilation

- A client who was hospitalized for pneumonia is being discharged to home.
- Discuss important elements of a teaching plan for the patient with the nursing diagnosis of Deficient Knowledge related to prevention of upper respiratory infections.

Fungal Infections of the Lung

ORGANISM	CHARACTERISTICS
Histoplasmosis *Histoplasma capsulatum*	Indigenous to soil of North American river valleys, inhalation of mycelia into lungs, infected individual often free of symptoms, generally self-limiting, chronic disease similar to TB
Coccidioidomycosis *Coccidioides immitis*	Indigenous to semiarid regions of southwestern United States, inhalation of arthrospores into lungs, suppurative and granulomatous reaction in lungs, symptomatic infection in one third of individuals
Blastomycosis *Blastomyces dermatitidis*	Indigenous to southeastern and midwestern United States, inhalation of fungus into lungs, progression of disease often insidious, possible involvement of skin
Cryptococcosis *Cryptococcus neoformans*	True yeast, indigenous worldwide in soil and pigeon excreta, inhalation of fungus into lungs, possible meningitis
Aspergillosis *Aspergillus niger or Aspergillus fumigatus*	True mold inhabiting mouth, widely distributed, invasion of lung tissue resulting in possible necrotizing pneumonia; in individual with asthma, allergic bronchopulmonary aspergillosis may require corticosteroid therapy
Candidiasis *Candida albicans*	Leading cause of mycotic infections in hospitalized and immunocompromised hosts, ubiquitous and frequent colonization of upper respiratory and GI tracts, infections often following broad-spectrum antibiotic therapy (systemic or inhaled), possible development of localized pulmonary infiltrate to widespread bilateral consolidation with hypoxemia
Actinomycosis *Actinomyces israeli*	Not a true fungus, pseudohyphae present; anaerobic; gram-positive, higher bacteria with branching hyphae; presence of necrotizing pneumonia after aspiration; pneumonitis, commonly in lower lobes with abscess or empyema formation
Nocardiosis *Nocardia asteroides*	Not a true fungus; aerobic, higher bacteria with branching hyphae; soil saprophyte widely distributed in nature; acquisition of infection from nature; rarely present in sputum without accompanying disease

Interferences with Ventilation
Tuberculosis

- **Infectious disease**
  - Cause: Mycobacterium tuberculosis
  - Involves lungs; may occur in larynx, kidneys, bones, adrenal glands, lymph nodes and meninges
  - WHO – estimates 8+ million new cases annually
  - 1940-50's – decrease in the prevalent due to INH & streptomycin
  - 1985 – 1992 – significant increase in TB cases
  - Since 1993 – decreasing steadily
    - US: 5.8 cases per 100,000 reported in 2000
    - Estimated 15 million people are infected
      - **Major public health concern – HIV infection and immigration of persons from areas of high incidence**

Interferences with Ventilation
Tuberculosis

- **Major factors in resurgence of TB**:
  - Epidemic proportion of TB among patients with HIV
  - Emergence of multi drug-resistant strains
- **Occurrence**:
  - Disproportionately in the poor, underserved, and minorities
  - At risk: homeless, residents of inner-city neighborhoods, foreign-born persons, older adults, those that live in long-term care facilities, prisons, injection drug users, immunosuppressed
  - US geographic areas: large populations of native Americans, US borders with Mexico

Interferences with Ventilation
Tuberculosis - Pathophysiology

- **M. tuberculosis** – gram-positive, acid-fast bacillus
- **Spread from person to person via airborne droplets**
  - Coughing, sneezing, speaking – disperse organism and can be inhaled
  - Not highly infectious – requires close, frequent, and prolonged exposure
  - Cannot be spread by hands, books, glasses, dishes, or other fomites

Interferences with Ventilation
Tuberculosis – Pathophysiology

- **Bacilli are inhaled, implanted on bronchioles or alveoli, multiply during phagocytosis**
- Lymphatic spread – cell-mediated immune response
- **Cellular immunity limits further multiplication & spread**
- Epithelioid cell granuloma results
  - Fusion of infiltrating macrophages
  - Reaction takes 10-20 days
  - Ghon tubercle – the central portion of the lesion undergoes necrosis – caseous necrosis
  - **Healing** – resolution, fibrosis, and calcification
    - **Ghon Complex is formed – composed of calcified Ghon tubercle & regional lymph nodes**

Interferences with Ventilation
Tuberculosis – Clinical Manifestations

- **Early stages** – free of symptoms
  - Many cases are found incidentally
- **Systemic manifestations**:
  - Fatigue, malaise, anorexia, weight loss, low-grade fevers, night sweats
  - Weight loss – occurs late
  - Characteristic cough – frequent & produces mucoid or mucopurulent sputum
  - Dull or tight chest pain
- **Some cases**: acute high fever, chills, general flulike symptoms, pleuritic pain, productive cough
- **HIV Pt with TB**: Fever, cough, weight loss – Pneumocystic carinii pneumonia (PCP)

Interferences with Ventilation
Tuberculosis – Complications

- **Miliary TB – Hematogenous TB** that spreads to all body organs – Pt is acutely ill
- **Pleural Effusion and Empyema** – release of caseous material into the pleural space
- **Tuberculosis Pneumonia** – symptoms similar to bacterial pneumonia
- **Other Organ Involvement**: meninges, kidneys, adrenal glands, lymph nodes, genital organs

Interferences with Ventilation
Tuberculosis – Diagnostic Studies

- **Tuberculin Skin Testing** -- + reaction 2-12 weeks after the initial infection
  - **PPD** – Purified protein derivative – used to detect delayed hypersensitivity response
    - Two-step testing – health care workers
    - 5mm > induration – Immunosuppressed patients
    - 10 mm> “at risk” populations & health are workers
    - 15 mm> Low risk people
  - Chest X-ray -- used in conjunction with skin testing
    - Multinodular lymph node involvement with cavitation in the upper lobes of the lungs
    - Calcification – within several years after infection
  - **Bacteriologic Studies** –
    - Sputum, gastric washings –early morning specimens for acid-fast bacillus -- three consecutive cultures on different days
    - CSF or pus from an abscess

Interferences with Ventilation
Tuberculosis – Medical Management

- **May be treated as outpatient**
  - Depends on debility and severity of symptoms
- **Mainstay of treatment**: drug therapy for active disease:
  - Five primary drugs:
    - Isoniazid (INH)
    - Rifampin
    - Pyrazinamide
    - Streptomycin
    - Ethambutol
  - **Combination 4 drug therapy**
  - HIV patients cannot take rifampin – interferes with antiretroviral drug effectiveness

Drug	Usual Dosage	Nursing Interventions	Drug Action/Rationale for Use
Isoniazid (INH)	5 mg/kg PO, IM (maximum 300 mg) daily; 15 mg/kg (maximum 900 mg) biweekly	Observe for drug interactions. It may inhibit drug metabolism of phenytoin, carbamazepine, primidone, and warfarin. Instruct the client to take on empty stomach and avoid antacids. Monitor for signs of hepatitis and neurotoxicity effects.	Isoniazid inhibits the synthesis of mycolic acids and acts to kill actively growing organisms in the extracellular environment and inhibits the growth of dormant organisms in the macrophages and caseating granulomas.
Rifampin (RIF)	10 mg/kg PO (maximum 600 mg) daily or biweekly	Instruct the client that secretions, including urine, will be orange in color and that the drug will permanently discolor soft contact lenses. Observe for drug interactions. It may enhance elimination of theophylline, steroids, opioids, oral hypoglycemics, warfarin, and occasionally vitamin D. Observe for hepatotoxic effects. RIF decreases effectiveness of oral contraceptives.	Rifampin has the unique ability to kill slower growing organisms that reside in the caseating granuloma and macrophage.
Pyrazinamide (PZA)	15-30 mg/kg PO (maximum 2000 mg) daily; 50 mg/kg biweekly	Observe for hepatotoxic effects.	Pyrazinamide is the most active drug at killing mycobacteria present in macrophages. The acidic environment in the macrophage inhibits most agents.
Ethambutol (EMB)	15 mg/kg daily PO; 50 mg/kg biweekly	Obtain baseline visual acuity and color discrimination, especially to the color green. Repeat testing every 1-2 mo.	Ethambutol inhibits bacterial ribonucleic acid (RNA) synthesis. It is slow acting and must be used in combination with other bactericidal agents.
Streptomycin (SM)	1000 mg IM, IV over 1 hr, daily for 2 mo followed by biweekly injections until treatment is completed	Obtain baseline audiometric test every 1-2 mo. It can impair the eighth cranial nerve. Older clients are especially susceptible.	Streptomycin is an aminoglycoside antibiotic that is active against extracellular organisms only.
Amikacin	15 mg/kg daily IM, IV (usual dose 1 g)	Ensure adequate hydration, monitor renal function and hearing. Amikacin can lead to renal toxicity and ototoxicity.	Amikacin is an aminoglycoside antibiotic that can be used if streptomycin is not available.
Rifapentine (Priftin)	600 mg twice weekly	Doses must be separated by at least 72 hr. Instruct the client that metabolism of other drugs may be faster, causing lower blood concentrations and a need for higher doses (especially for antidiabetic drugs, barbiturates, and antibiotics). Instruct female clients to use additional forms of birth control, because this drug decreases the effectiveness of oral contraceptives. Observe for hepatotoxic effects.	Rifapentine has high bacteriostatic and bactericidal action against slow-growing intracellular bacteria.

Interferences with Ventilation
Tuberculosis – Nursing Management

Nursing Diagnosis

Interferences with Ventilation
Tuberculosis – Nursing Management

- **Nursing Diagnoses** –
  - Ineffective breathing pattern
  - Imbalanced nutrition
  - Noncompliance related to lack of knowledge
  - Ineffective health maintenance
  - Activity intolerance
- **Goals** –
  - Patient compliance with therapy
  - No recurrence of disease
  - Normal pulmonary function
  - Measures to prevent spread of disease

Interferences with Ventilation
Tuberculosis – Nursing Management

- **Assess**: Respiratory status—cough—productive?, pleuritic chest pain, adventitious breath sounds; fever; night sweats; degree of debilitation
- **Nsg Action**:
  - If hospitalized – respiratory isolation – negative pressure isolation room; High-efficiency particulate air (HEPA) masks
  - Four-drug therapy
- **Pt Education**: cover nose & mouth with tissue when coughing, sneezing, producing sputum; dispose of tissues in red-bag trash; hand-washing; drug therapy adherence; test and treat exposed close contacts; follow-up care; signs & symptoms of recurrence
- **Problem:** adherence – DOT – directly observed therapy by RN or family member

Pair Share – Critical Thinking

- An older adult client complains of loss of hearing and dizziness after 1 month of taking the medications for TB. The nurse would advise the client to do which of the following?
  - A. Continue taking the medications; the symptoms will eventually subside
  - B. Consult a physician because this could be a sign of toxicity
  - C. Not be concerned because this symptom is common with all TB medication
  - D. Wait for 1 more month, if the symptom continues, consult a physician

Pair Share – Critical Thinking

- A patient with TB has prescribed two or more pharmacologic agents. Explain why this treatment is prescribed.

Interferences with Ventilation Communicable Diseases in Children

Schedule of Immunizations

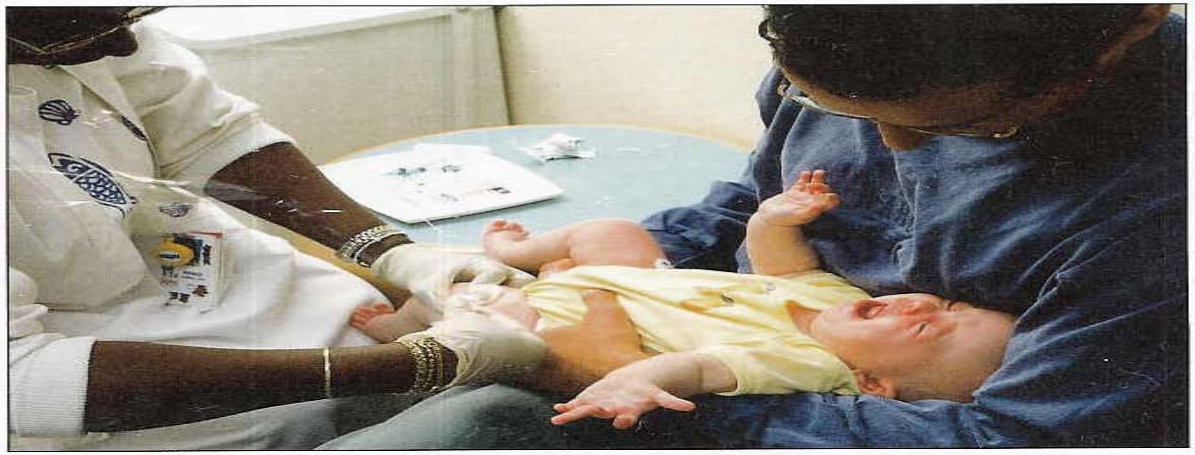
For

Infants and Children

NURSING CARE PLAN The Child Needing Immunizations

GOAL	INTERVENTION	RATIONALE	EXPECTED OUTCOME
1. Risk for infection related to incomplete immunization series			
	NIC Priority Intervention: **Immunization Administration:** Provision of immunizations for prevention of communicable disease.		NOC Suggested Outcome: **Risk Control:** Actions to eliminate or reduce actual, personal, and modifiable health threats.
The child will become adequately protected from disease-preventable illnesses.	■ Review the child's immunization record for needed vaccines at each health care visit. ■ Identify all due vaccines that can be provided simultaneously. ■ Identify potential contraindications to needed vaccines. Review past reactions to vaccines.	■ Assessment identifies the children who have missed needed immunizations. ■ Many vaccines can be given at the same visit to more adequately protect the child. This also saves health care trips for families. ■ Reduces the risk for the child and other caretakers to have adverse reactions to vaccines.	The child is adequately protected from vaccine-preventable illnesses.
2. Knowledge deficit (parent) related to potential side effects of vaccines			
	NIC Priority Intervention: **Teaching, Prescribed Vaccines:** Preparing a patient to safely take prescribed vaccines and monitor their effects.		NOC Suggested Outcome: **Knowledge:** Vaccine reactions and comfort measures: Extent of understanding conveyed about treatment regimen.
Parents will sign consent for vaccines to be given.	■ Educate the parents about the need for specific vaccines and the risk if not given. Obtain signed consent before giving vaccines.	■ Informed consent is required for all treatments.	The parent(s) complete(s) consent form, which is placed in the child's file.
Parents will state the side effects of vaccines given.	■ Review past reactions to vaccines and describe common potential reactions and why they occur.	■ Parents should expect common reactions and know they indicate the child's body is building protection to the illness.	Parents report all serious side effects to the health care provider.
Parents will manage common side effects of vaccines.	■ Describe serious side effects that should be reported to health care provider.	■ Parents need to be prepared for potential serious side effects so they can obtain care.	The child is given comfort measures after vaccine administration.

FIGURE 12-4 ◆
Give immunizations quickly and efficiently. Do not prolong the wait and let fear grow. The child will be anxious, especially if more than one injection must be given.



GOAL	INTERVENTION	RATIONALE	EXPECTED OUTCOME
2. Knowledge deficit (parent) related to potential side effects of vaccines (continued)			
	■ Teach parents general comfort measures for children's common side effects, for example: ■ Cool pack to tender leg ■ Acetaminophen for fever and discomfort ■ Rocking and holding the infant ■ Gentle movement of affected extremity	■ Parents will know how to make the child more comfortable during the 24–48 hours after the vaccine is given.	
3. Risk for injury related to vaccine reaction			
	NIC Priority Intervention: **Vaccine Precautions:** Reducing the risk of a systemic reaction to vaccine.		NOC Suggested Outcome: **Risk Control:** Actions to eliminate or reduce actual, personal, and modifiable health threats.
The child's potential vaccine reactions will be safely managed.	■ Prepare for life-threatening reactions by having resuscitation drugs and equipment immediately available. ■ Monitor the child for 15 minutes after the vaccine is given before letting the child go home. ■ Assess the child for extreme anxiety and injection fearfulness. ■ Have the fearful child sit or lie down until symptoms of vasovagal response have disappeared. ■ Report all vaccine-related reactions	■ Anaphylactic reactions must be managed quickly and effectively. ■ A life-threatening response will usually become apparent within this time frame. ■ These are potential signs the child may have a vasovagal response to the injection. ■ The child who faints may sustain a head injury. ■ Legal requirements for all health	The child has no reaction or has a severe reaction to a vaccine that is managed effectively.

TABLE 12-3 Common Pediatric Immunizations

IMMUNIZATION TYPE	SIDE EFFECTS	CONTRAINDICATIONS	NURSING CONSIDERATIONS
Diphtheria and Pertussis Vaccines and Tetanus Toxoid (DTaP) *Route:* Intramuscular *Dosage:* 0.5 mL *Age(s) Given:* 2, 4, 6, 15–18 months; 4–6 years (5 doses) *Storage:* Store in body of refrigerator at 2°–8°C (35°–46°F). Do not freeze. *ACEL*-IMUNE and Tripedia are licensed for all 5 doses. Infanrix and Certiva are licensed for the first 4 doses (Centers for Disease Control, 2000)	*Common:* Redness, pain, swelling, nodule at injection site; temperature up to 38.3°C (101°F); drowsiness, fussiness; anorexia within 2 days of injection. Increase in frequency and magnitude of local reactions with doses 4 and 5 (e.g., entire limb swelling). *Serious:* Anaphylaxis; shock or collapse; fever above 38.8°C (102°F); persistent inconsolable crying.	Occurrence of a serious side effect after previous administration of DTaP, such as anaphylaxis. Administration to be delayed for 1 month after immunosuppressive therapy and until moderate to severe febrile illnesses have resolved. Administration of immune serum globulin within last 90 days.	Use same brand for all doses where feasible. Prior to immunization, ask about previous reactions to immunization. DTaP may coincide with or hasten the recognition of a seizure disorder. In children with a history of seizures with or without fever, give acetaminophen at the time of vaccine and then every 4 hours for 24 hours. Shake vaccine before withdrawing. Solution will be cloudy. If it contains clumps that cannot be resuspended, do not use. When required, simultaneous administration of tetanus immune globulin or diphtheria antitoxin should be given in separate sites with a new needle and syringe. Inform parents of the chance of increased reaction to doses 4 and 5.
Poliovirus Vaccine Inactivated (IPV) *Route:* Subcutaneous *Dosage:* 0.5 mL *Age(s) given:* 2, 4, 12–18 months; 4–6 years (4 doses) *Storage:* Store in body of refrigerator at 2°–8°C (35°–46°F). Do not freeze	*Common:* Swelling and tenderness, irritability, tiredness *Serious:* Anaphylaxis	Hypersensitivity to vaccine components: neomycin, streptomycin, and polymyxin B. Anaphylactic response.	Prior to immunization, ask if the child has an allergy to neomycin, streptomycin, or polymyxin B. Clear, colorless suspension. Do not use if it contains particulate matter, becomes cloudy, or changes color. Recommended for use in all vaccine doses.
Measles, Mumps, Rubella Vaccines (MMR) *Route:* Subcutaneous *Dosage:* 0.5 mL *Age(s) given:* 12–15 months; 4–6 years (2 doses) *Storage:* Store in body of refrigerator at 2°–8°C (35°–46°F). When reconstituted, keep refrigerated and away from light; discard if unused within 8 hours. Diluent is stored at room temperature or in refrigerator. Do not freeze.	*Common:* Elevated temperature 1–2 weeks after immunization; redness or pain at injection site; noncontagious rash; joint pain. *Serious:* Anaphylaxis; encephalopathy; thrombocytopenia purpura, chronic arthritis.	Allergy to neomycin or gelatin. Severely impaired immune system due to malignancy, immune deficiency disease, immunosuppressive therapy. MMR vaccine is recommended for those infected with HIV. Wait at least 3 to 11 months after administration of immune serum globulin or blood products (time determined by the type) before giving vaccine. Pregnancy.	Prior to immunization, ask if child has allergy to neomycin or gelatin. Inquire about immunosuppression. Instruct adolescent girls of childbearing age to avoid pregnancy for 3 months after immunization. Give tuberculosis (TB) skin test at same time as MMR or 4–6 weeks later. Reconstituted vaccine is a clear, yellow solution. Give entire contents of vial even if more than 0.5 mL. As college students are at greater risk due to decreasing immunity, make sure they have received a second MMR dose.
Hepatitis B Vaccine (HB) *Route:* Intramuscular *Dosage:* Engerix-B: 0.5 mL or Recombivax HB: 0.5 mL *Age(s) given:* Birth–2 months, 1 month after first dose; 6 months after first dose *or* Birth–2 months, 1–4 months, 6–18 months (3 doses) *Storage:* Store in body of refrigerator at 2°–8°C (35°–46°F). Do not freeze. Storage out of recommended temperature range decreases potency.	*Common:* Pain or redness at injection site; headache; photophobia; altered liver enzymes. *Serious:* Anaphylaxis	Prior anaphylaxis, liver abnormalities. Serious allergic reaction to past dose.	Prior to immunization, check status of mother's hepatitis B test and presence of other liver disease. Note: If mother has HbsAg+, vaccine must be given to infant within 12 hours of birth along with hepatitis B immune globulin at the same time in another site with new needle and syringe. Shake vaccine before withdrawing. Solution will appear cloudy. Various formulations (pediatric, adult, dialysis) are available in different strengths. Read package insert carefully to determine proper dosage for age for the particular formulation used.

TABLE 12-3 Common Pediatric Immunizations (continued)

IMMUNIZATION TYPE	SIDE EFFECTS	CONTRAINDICATIONS	NURSING CONSIDERATIONS
Haemophilus influenza Type B (Hib) *Route:* Intramuscular *Dosage:* 0.5 mL *Age(s) given:* 2, 4, 6, 12–15 months (4 doses for HbOC[a] [HibTITER] and PRP-T[a] [ActHIB or OmniHIB]) *or* 2, 4, 12–15 months (3 doses for PRP-OMP[a] [PedvaxHIB]) *Storage:* Store in body of refrigerator at 2°–8°C (35°–46°F). Do not freeze. Use or discard reconstituted ActHIB and OmniHIB within 30 minutes. Refrigerate reconstituted PedvaxHIB and discard within 24 hours.	*Common:* Pain, redness, or swelling at site *Serious:* Anaphylaxis (extremely rare)	Prior anaphylactic reaction to this vaccine.	Prior to immunizations, ask if child is immunosuppressed. Solution is clear and colorless. Since schedules for product preparations of different companies vary, it is important to read package inserts carefully. Use the same vaccine preparation for all doses of the primary series if possible. Some preparations combine Hib with DTaP (TriHIBit), DT (VaxemHIB), and Hep B (Comvax).
Heptavalent Pneumococcal Conjugate Vaccine (PCV) *Route:* Intramuscular *Dosage:* 0.5 mL *Age(s) given:* 2, 4, 6, 12–15 months *Storage:* Store in body of refrigerator at 2°–8°C (35°–46°F). Do not freeze.	*Common:* Soreness, swelling, redness at injection site; mild to moderate fever; irritability, drowsiness, restless sleep, decreased appetite, vomiting and diarrhea, rash or hives. *Severe:* Anaphylaxis	Hypersensitivity to diphtheria toxoid.	Clear, colorless, or slightly opalescent liquid. In addition to infants this vaccine is a priority for children 2–5 years with sickle-cell disease, asplenia, HIV infection, or immunocompromised. The vaccine is also a priority for American Indian and Native Alaskan children 2–5 years because of their increased risk for pneumococcal disease.
Varicella Virus Vaccine (Varivax) *Route:* Subcutaneous *Dosage:* 0.5 mL *Age(s) given:* 12–18 months; or any time up to 12 years of age (1 dose); 13 years or older (2 doses 4–8 weeks apart) *Storage:* Frozen at 5°F or colder. May be stored in refrigerator at 2°–8°C (35°–46°F) up to 72 hours before reconstitution. Once reconstituted, vaccine must be used within 30 minutes or discarded. Do not refreeze. Diluent kept at room temperature.	*Common:* Pain or redness at injection site; fever up to 38.8°C (102°F) in children or up to 37.7°C (100°F) in adults; rash at injection site or generalized. *Severe:* Anaphylaxis	Allergy to neomycin or gelatin. Immunodeficiency or receiving immunosuppression therapy. Administration of immune serum globulin or blood products in last 3–11 months. Active untreated TB. Pregnancy. Moderate or severe febrile illness.	Prior to immunization, ask if child is immunodeficient, is on immunosuppression treatment, or has had an allergy to neomycin or gelatin. Clear, colorless to pale yellow liquid when reconstituted. Give the entire contents of the vial even if more than 0.5 mL. Instruct adolescent girls of childbearing age to avoid pregnancy for 3 months after immunization.
Hepatitis A, inactivated (Hep A) *Route:* intramuscular *Dosage:* 0.5 mL, 1.0 mL over 17 years for Vaqta,[a] 1.0 mL over 18 years for Havrix[a] *Age(s) given:* 2–18 years, 6–12 months after first dose (2 doses) in areas with increased incidence. *Storage:* Store in body of refrigerator at 2°–8°C (35°–46°F). Do not freeze; do not use if frozen.			Shake well, slightly opaque white suspension. Can be given for postexposure prophylaxis against Hepatitis A. Immune globulin and vaccine can be given at the same time in different sites. High incidence areas include the states of Alaska, Arkansas, Arizona, California, Colorado, Idaho, Missouri, Montana, New Mexico, Nevada, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. Other high-risk populations to receive vaccine include Native Alaskans and American Indians (Centers for Disease Control, 2001).

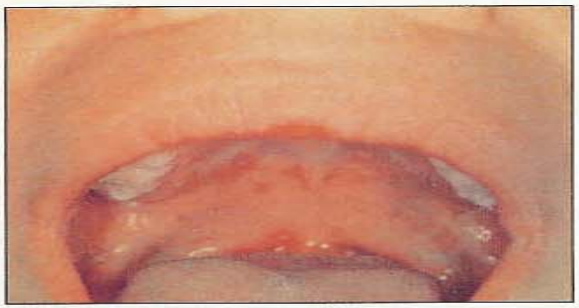
TABLE 12-4 National Vaccine Injury Compensation Program—Vaccine Injury Table

VACCINE	ILLNESS, DISABILITY, INJURY, OR CONDITION COVERED	TIME PERIOD FOR FIRST SYMPTOM OR MANIFESTATION OF ONSET OR OF SIGNIFICANT AGGRAVATION AFTER VACCINE ADMINISTRATION—FOR COMPENSATION
DTaP, P, DT, Td, DTP-Hib, or Tetanus Toxoid; or any other vaccine containing whole cell pertussis bacteria, extracted or partial cell pertussis bacteria, or specific pertussis antigen(s)	Anaphylaxis or anaphylactic shock Encephalopathy (or encephalitis) Bacterial neuritis Any acute complication or sequela (including death) of above events. Events described in manufacturer's package insert as contraindications of additional doses of vaccine.	0–4 hours 72 hours 2–28 days No limit Not applicable
Measles, mumps, rubella, or any vaccine containing any of the foregoing as a component	Anaphylaxis or anaphylactic shock Encephalopathy (or encephalitis) Events described in manufacturer's package insert as contraindications of additional doses of vaccine.	0–4 hours 5–15 days for measles, mumps, rubella, or any vaccine containing any of the foregoing as a component. Not applicable
Rubella-containing vaccines	Chronic arthritis	7–42 days
Measles-containing vaccines	Thrombocytopenia purpura Vaccine strain measles viral infection in an immunodeficient recipient.	7–30 days 0–6 months
Inactivated polio vaccine	Anaphylaxis or anaphylactic shock Any acute complication or sequela (including death) of above events. Events described in manufacturer's package insert as contraindications of additional doses of vaccine.	0–4 hours No limit Not applicable
Hepatitis B antigen–containing vaccines	Anaphylaxis or anaphylactic shock Any acute complication or sequela (including death) of above events. Events described in manufacturer's package insert as contraindications of additional doses of vaccine.	0–4 hours No limit Not applicable
Haemophilus influenzae type B polysaccharide vaccines (unconjugated, PRP vaccines)	Any early-onset Hib disease Any acute complication or sequela (including death) of above events. Events described in manufacturer's package insert as contraindications of additional doses of vaccine.	0–7 days No limit Not applicable
Haemophilus influenzae type B polysaccharide conjugate vaccine	No condition specified for compensation Events described in manufacturer's package insert as contraindications of additional doses of vaccine.	Not applicable Not applicable
Varicella virus–containing vaccine	No condition specified for compensation Events described in manufacturer's package insert as contraindications of additional doses of vaccine.	Not applicable Not applicable

Note: Used with the permission of the American Academy of Pediatrics. (2000). *Red Book: Report of the Committee on Infectious Disease* (25th ed.). Elk Grove Village, IL: Author.

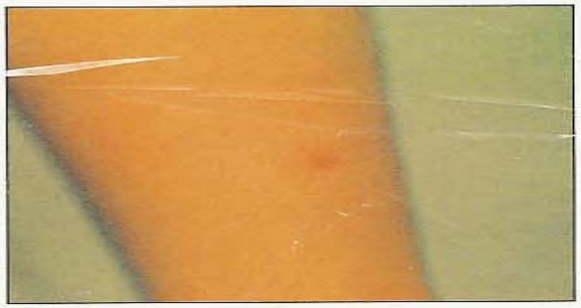
TABLE 12-5 Selected Infectious and Communicable Diseases in Children

DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Chickenpox (Varicella)*† *Causal agent:* Varicella-zoster, human herpesvirus 3. *Epidemiology:* Peak occurrence is in the late fall, winter, and spring. Maternal antibodies disappear 2–3 months after birth. *Transmission:* Direct contact with lesions or airborne spread of secretions. *Incubation period:* 14–21 days *Period of communicability:* As long as 5 days before the onset of the rash to a maximum of 6 days after the appearance of the first group of vesicles, when all lesions have crusted over. This period may be prolonged after passive immunization or in immunodeficient children.	The onset of symptoms is acute. Mild fever, malaise, and irritability occur before and with eruption. The rash begins as a macule on an erythematous base and progresses to a papule, then a clear, fluid-filled vesicle. Lesions are often described as a "teardrop on a rose petal" and may erupt for 1–5 days. Lesions of all stages may be present at any one time. Crusts may remain for 1–3 weeks. Lesions in the mouth may lead to decreased fluid intake and dehydration. *Complications:* Most are rare but can include secondary infection, encephalitis, varicella pneumonia, thrombocytopenia, hepatitis, glomerulonephritis, arthritis, meningitis, and Reye syndrome. This disease may cause very significant illness or death to immunocompromised children.	There is no cure for chickenpox. Medical management is supportive. Oral and IV Acyclovir is used for immunocompromised patients. If started within 24 hours will decrease new lesion formation and the total number of lesions, but this is not recommended for healthy children with uncomplicated chickenpox (American Academy of Pediatrics, 2000). *Prognosis:* Most children recover fully. Children who are immunocompromised must be treated aggressively. This includes children on steroids for asthma and other illnesses, and those on long-term salicylate treatment. The disease is more severe when steroids have been given during the incubation period (Twomey, 1998). *Prevention:* Chickenpox is a vaccine-preventable disease. The immunization may be given to susceptible children at any time after 12 months of age. The vaccine may be given within 72 hours after exposure to prevent or significantly modify the disease. Varicella-zoster immune globulin may be given to exposed immunocompromised children with no history of chickenpox or immunization up to 4 days after exposure.	■ Use airborne and contact precautions for hospitalized children while they are contagious. ■ Obtain a history of varicella immunization and recent exposure in susceptible children upon admission to the hospital. Place all children exposed to varicella in isolation as a means of protecting immunocompromised patients. Nurses caring for the child should have a varicella titer done to be certain of their immune status if they have not had a documented case of chickenpox. ■ Most children are treated at home. While contagious, isolate them from all susceptible individuals, especially medically fragile children and immunocompromised children or adults, and women early in pregnancy. Notify the school or child care facility of the child's illness. ■ Give nonaspirin antipyretics to control fever. ■ Give oral antihistamines for relief of itching. Oatmeal and Aveeno baths are soothing. Caladryl lotion applied in moderation to lesions may also provide relief. ■ Observe the child closely for drowsiness, meningeal signs, respiratory distress, and dehydration. ■ Keep the child's fingernails short and clean. Young children may need to wear soft cotton mittens to prevent infections when itching cannot be controlled. ■ Change bed linens frequently. Linen should be washed in mild soap and rinsed well. ■ Watch for symptoms of complications. ■ Disorientation and restlessness may indicate viral encephalitis. ■ Reassure the child that the lesions are temporary and will go away.



A

Mouth lesions of chickenpox.
Courtesy of Centers for Disease Control and Prevention, Atlanta, GA.



B

Skin lesions of chickenpox.

NURSING ALERT

Chickenpox can be fatal in immunocompromised children. When undergoing chemotherapy, steroid treatment, or transplant therapy, children should be carefully monitored after exposure to the disease. Varicella-zoster immune globulin is usually administered as soon as possible after exposure. A chickenpox vaccine is available and recommended for use in all children who have not had the disease.

*Indicates that a vaccine or antitoxin is available for use in high-risk or as-needed situations.
†Indicates that the disease has a safe and effective vaccine.

TABLE 12-5 Selected Infectious and Communicable Diseases in Children (continued)

DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Coxsackievirus *Causal agent:* Coxsackievirus A16 and Enterovirus 71 cause a wide group of acute diseases that range from minor and self-limiting to potentially fatal. *Epidemiology:* Occurs worldwide, most commonly in summer and early fall. Sporadic outbreaks are seen, especially among children in out-of-home settings. Illnesses include the common cold; pharyngitis; pneumonia; hand, foot, and mouth disease; and herpangina. Immunity probably occurs after clinical or subclinical infection, but duration of the immunity is unknown. *Transmission:* Fecal–oral route; probably respiratory route. *Incubation period:* 3–6 days. *Period of communicability:* 2 days before rash to 2 days after it disappears.	Each of the coxsackieviruses is responsible for a different set of manifestations. Herpangina is an acute, self-limiting viral disease characterized by the sudden onset of fever, sore throat, and small, discrete greyish papulovesicular ulcerative pharyngeal lesions that gradually increase in size. In hand, foot, and mouth disease the lesions are more diffuse and may occur on the buccal surfaces of the cheeks, gums, and sides of the tongue. Papulovesicular lesions occur on the hands and feet and last for 7–10 days. Children may be irritable and have a fever, anorexia, dysphagia, malaise, and a sore throat. *Complications:* Enterovirus 71 caused a fatal epidemic in Taiwan in 1998. Of the 90,000 cases of hand, foot, and mouth disease, 78 deaths resulted (Chang, Lin, & Hsu, et al., 1999).	There is no specific treatment. An antiviral medication, pleconaril, is being evaluated for use in immunodeficient children (American Academy of Pediatrics, 2000). *Prognosis:* Recovery is generally good with supportive care. *Prevention:* Avoid contact with infected persons early in the disease.	■ Isolate the child while contagious. Use contact precautions if the child is hospitalized. ■ Apply topical lotions and give systemic medications as ordered to lessen the pain and relieve the irritation. ■ Offer cool drinks and soft, bland foods (no citrus, salty, or spicy foods). Swallowing may be painful. ■ Offer warm saline mouth rinses. ■ Observe for dehydration. ■ Provide reassurance and support to parents. ■ Give nonaspirin antipyretics for fever. Keep the child out of school or child care while the child is febrile.
Diphtheria*† *Causal agent:* Corynebacterium diphtheriae, a bacterium *Epidemiology:* Occurs mostly during colder months in temperate zones in unimmunized, partially immunized, and immunized children with waning immunity. In tropical areas, cases of cutaneous and wound diphtheria occur sporadically. Maternal immunity lasts as long as 6 months after birth. While there are less than 5 cases annually in the United States, the disease is endemic in areas where immunization is no longer routine, such as Russia. *Transmission:* By contact with an infectious patient or carrier's nasal or eye discharge, or skin lesion; or less commonly, indirectly by contact with contaminated articles. Unpasteurized milk has also served as a vehicle. *Incubation period:* 2–7 days, sometimes longer *Period of communicability:* Varies but is usually 2–4 weeks or until 4 days after antibiotics are initiated.	Symptoms can be mild or severe with a gradual onset over 1–2 days. Low-grade fever, anorexia, malaise, rhinorrhea with a foul odor, cough, hoarseness, stridor or noisy breathing, cervical lymphadenitis, and pharyngitis may be present. In more severe cases the membranes of the tonsils, pharynx, and larynx are affected. The characteristic membranous lesion is a thick, bluish white to grayish black patch that covers the tonsils. It can spread to cover the soft and hard palates and the posterior portion of the pharynx. Attempts to remove the membrane result in bleeding. *Complications:* Produces an endotoxin that causes myocarditis and peripheral neuropathy (diplopia, slurred speech, difficulty swallowing, or paralysis of the palate) or ascending paralysis similar to Guillain-Barre syndrome.	Administration of IV antitioxin and antibiotics within 3 days of onset of symptoms. The child must be tested for sensitivity to horse serum before giving the antitoxin. When diphtheria is suspected, antibiotic therapy (penicillin G or erythema) should be initiated without waiting for laboratory results. Removal of membrane may be needed to treat airway obstruction. *Prognosis:* With treatment, prognosis is good. If untreated, diphtheria can cause death from airway obstruction. *Prevention:* Diphtheria is a vaccine-preventable disease. The immunization series is initiated at 2 months of age and is usually given in combination with tetanus and pertussis. Diphtheria-tetanus (Td) is administered to children over 7 years. This is a reportable disease.	■ Use droplet precautions for pharyngeal disease and contact precautions for cutaneous disease. ■ Monitor closely for signs of increasing respiratory distress, as well as cardiac and neurologic complications. Provide humidified oxygen as necessary. ■ Have emergency airway equipment available. ■ Administer antibiotics. Give no medications containing caffeine or other stimulants. ■ Use oral suction gently as necessary. ■ Allow children to use mouthwash if desired. Gargling is not permitted because it can irritate the back of the throat. ■ Encourage liquids as tolerated. Intravenous fluids may be necessary. ■ Provide emotional support to the family. ■ Initiate the trace for contacts with the patient to give antibiotics and immunization boosters.

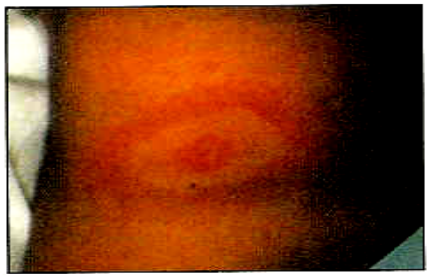
TABLE 12-5 Selected Infectious and Communicable Diseases in Children (continued)

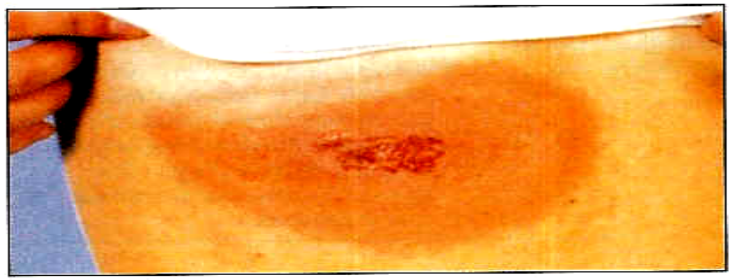
DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
rythema Infectiosum (Fifth Disease) *ausal agent:* Human parvovirus B19 *pidemiology:* Occurs worldwide, most often in winter and spring. The disease also occurs in epidemics, with peak activity every 6 years. The incidence is highest in children between the ages of 5 and 14 years. *ransmission:* Respiratory secretions and blood. *cubation period:* 6–14 days *eriod of communicability:* Believed to be the highest before the onset of the disease. Not contagious after rash appears unless in aplastic crisis (Adams & Ware, 1996).	The child first manifests a flulike illness (headache, chills, malaise, nausea, body ache) that lasts 2–3 days; 1 week later, a fiery red rash appears on the cheeks giving a "slapped face" appearance. The rash is accompanied by circumoral pallor. In 1–4 days a lacelike symmetric, erythematous, maculopapular rash appears on the truck and limbs, spreading proximal to distal. During the third stage, which lasts 1–3 weeks, the rash fades but can reappear if the skin is irritated or exposed to sunlight. The rash may be mildly pruritic. *Complications:* Children with hemolytic conditions may have transient aplastic crisis. The child has flulike symptoms but no rash. Arthritis occurs in 10% of children, lasting 1–6 days after the rash (Cherry, 1999).	There is no specific treatment, and recovery is spontaneous. Children with hemolytic conditions may need blood transfusion if aplastic crisis occurs. *Prognosis:* Fetal infection may occur resulting in spontaneous abortion. *Prevention:* Avoid contact with infected persons early in the disease.	■ Children with aplastic crisis are hospitalized. ■ Isolation is needed only for chil with aplastic crisis or when immunosuppressed. Use contac precautions. ■ Nonaspirin antipyretics may be given to control fever. ■ Use soothing oatmeal or Aveen baths if the rash is pruritic. Antipruritics may also help to re itching. ■ Encourage rest and offer freque fluids. ■ Keep children out of direct sunli if possible. ■ Provide protective, light, loose clothing if exposure to sunlight cannot be avoided. ■ Provide quiet diversionary activit There is no reason to keep the c out of school or daycare. ■ Explain the three stages of rash development to parents.

aracteristic facial rash of erythema infectiosum (Fifth disease).
urtesy of Centers for Disease Control and Prevention, Atlanta, GA.

dicates that a vaccine or antitoxin is available for use in high-risk or as-needed situations.
dicates that the disease has a safe and effective vaccine.

DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Lyme Disease (continued)	Stage 3 (late disseminated) occurs months later and includes problems such as Lyme arthritis and central nervous system changes. These may become chronic problems. *Complications:* Left untreated, Lyme disease can cause significant neurologic deficits, including arm and leg weakness, Bell's palsy, encephalopathy, meningitis, severe headaches, and cognitive and behavioral changes as well as chronic arthritis, and disorders of the peripheral nerves. The spriochete can cross the placental barrier and infect the fetus (Wade, 2000).	*Prevention:* A vaccine, LYMErix, is approved for high-risk patients 15–70 years. Some clinical trials in younger children appear promising. Avoid areas that are heavily tick infested, and wear protective clothing. Check for ticks (especially hidden in hair) after every outing. Check pets because they can carry home ticks that are then transferred to the child. Remove ticks as soon as possible. There is no acquired immunity.	■ To remove a tick, grasp it gently but firmly with fine-point tweezers where the mouthparts are attached. Pull gently—avoid squeezing of the tick's body—until it releases. Clean the area with soap and water. If any tick parts are left under the skin, take the child to a health care provider for removal. Tell them to mark the date of the tick bite on the calendar and monitor the child's health for flulike symptoms over the next 2 weeks. Encourage them to seek medical attention promptly if symptoms develop. ■ Provide emotional support.





The appearance of erythema migrans rash may vary in early Lyme disease.
From Pfizer Central Research. (1989). Lyme Disease. *Groton: CT: Author.*

LAW & ETHICS

Patients are sometimes denied health insurance coverage for oral and IV medications for long courses of treatment for Lyme disease. Connecticut passed legislation in 1999 requiring insurers to cover treatment. Other states are considering such legislation (Healy, 2000).

Malaria *Causal agent:* Plasmodium, four species (P. falciparum, P. vivax, P. ovale, P. malariae) *Epidemiology:* Occurs in tropical and subtropical regions on four continents (Africa, Americas, Asia, and Oceana). The disease is acquired during travel to an endemic area. *Transmission and incubation:* The bite of an infected female Anopheles mosquito during a nocturnal blood meal permits the parasite to enter the human blood stream. The parasite passes to the liver and infects hepatic cells. During an asymptomatic 5–16-day cycle, the parasite transforms to become a merozoite. The merozoites are released and infect the red blood cells.	Nonspecific signs such as myalgia, malaise, headache, abdominal pain, back pain, diarrhea, nausea, and vomiting are common. Spiking fever occurs at the time red blood cells rupture, becoming a classical cyclic pattern every 48–72 hours. Periods of symptomatic improvement are sometimes seen between spells.	The patient is hospitalized to receive fluid replacement, antipyretics, and anemia management. In severe disease with greater than 5% parasitemia, intensive care and IV treatment is needed. The blood is regularly monitored for parasite density. Quinine sulfate and tetracycline are used for chloroquine-resistant P. falciparum. Hypoglycemia may result from quinine treatment. Sulfadoxine-pyremethamine rather than tetracycline is used for children under 8 years of age. Mefloquine is used for chloroquine-sensitive organisms. Primaquine will cause severe anemia if given to individuals with G6PD disorder (Barat & Zucker, 1999).	■ Use standard precautions for the hospitalized patient. ■ Maintain fluid intake. Monitor intake and output. ■ Monitor blood glucose level and be prepared to respond to sudden hypoglycemia. ■ Observe for signs of increasing illness severity such as confusion, seizures, and shock. Be prepared to protect the patient from injury and provide emergency support with airways and oxygen supplementation until the child can be transferred to intensive care. ■ Monitor the hematocrit and hemoglobin levels. ■ Administer antipyretics to control the fever and promote comfort.

DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Haemophilus Influenzae Type B^{+} (H-Influenzae Type B) *Causal agent:* Coccobacilli *H. influenzae* bacteria, which has several serotypes and can be encapsulated or nonencapsulated. *Epidemiology:* Occurs most often in the spring and summer. Most commonly affected are infants and young children in childcare centers. Low-birth-weight children and children with chronic illnesses also have an increased susceptibility. Invasive disease has decreased 96% in the United States from 1987–1995 due to the vaccine (Kaplan, 1999) *Transmission:* Direct person-to-person contact or droplet inhalation. The organism is frequently asymptomatically colonized in the respiratory tract. *Incubation period:* Unknown. *Period of communicability:* 3 days from onset of symptoms.	*H. influenzae* type B starts with a viral upper respiratory infection. The organism passes through the mucosal barrier to directly invade the bloodstream. It can cause several severe invasive illnesses, including meningitis, epiglottitis, pneumonia, septic arthritis, and cellulitis. It is also a cause of sepsis in infants. Other illnesses include sinusitis, otitis media, bronchitis, and pericarditis. Each disease has very specific clinical manifestations. *Complications:* Illness caused by *H. influenzae* type B responds to antibiotic therapy. Left untreated, severe sequelae and death, especially in young infants, can occur from conditions such as meningitis, epiglottitis, sinusitis, pneumonitis, and cellulitis.	Treatment consists of antibiotic therapy; however, one-third of strains are resistant to ampicillin. Rifampin may be given to unprotected household contacts (not pregnant women), if another child has not completed immunizations, within 1 week after diagnosis. In this case, the infected child also gets rifampin to eliminate nasopharyngeal colonization. *Prognosis:* With rapid diagnosis and treatment, the outlook for recovery is good but highly dependent on the disease the organism has caused. When treatment has been delayed, the prognosis for full recovery becomes much more guarded. *Prevention:* Immunization is now available for *H. influenzae* type B as part of the recommended childhood immunization series beginning at 2 months of age. Other types of *H. influenzae* are not vaccine preventable.	■ Use droplet precautions until 24 hours after the initiation of antibiotics. ■ Antibiotic therapy is administered intravenously for severe infections. Infections such as otitis media can be managed at home with oral antibiotics. ■ Children under the age of 4 years wh have not been immunized are at increased risk for developing disease from *H. influenzae.* Specific prophylac tic measures for susceptible children may be ordered by the physician. ■ Administer antipyretics to help the child feel more comfortable. ■ Closely monitor IV sites for patency and infiltration. ■ Perform nursing care measures specific to the illness. ■ Inform family members that rifampin turns urine and other body fluids orange.
Hepatitis A, Hepatitis B, and Hepatitis C **See Chapter 17.**			
Lyme Disease* *Causal agent:* Borrelia burgdorferi, a spirochete, which is transmitted by ixodid ticks. *Epidemiology:* Distribution in the United States correlates highly with the distribution of various tick carriers (vectors). It occurs in 49 states and the District of Columbia. Exposure occurs in any outdoor setting where ticks are endemic. Animals such as dogs and cats can also have the disease. Lyme disease occurs yearround, with the highest risk of infection in the summer. Children between 5 and 14 years are at highest risk. Infection does not induce immunity. *Transmission:* Tick bite. The tick transmits the infected spirochete when it draws blood. The tick must feed for 36 hours to transmit the disease. *Incubation period:* 3–32 days after an infected tick bit. A rash in 48 hours is an allergic reaction or infection, not Lyme disease.	The most typical early symptom is a slowly expanding red rash, called erythema migrans, at the site of the bite, often found on the groin, axilla, or thigh. The rash starts as a flat or raised red area and may progress to partial clearing, develop blisters or scabs in the center. The rash may look like a bruise in dark-skinned patients. The rash has a "bull's-eye" appearance and is at least 5 cm in diameter. It resolves spontaneously within 4 weeks. Only 50%–75% of patients have the rash (Wade, 2000). Stage 1 symptoms, lasting 5–21 days, include malaise, fatigue, headache, stiff neck, mild fever, and muscle and joint aches. Stage 2 (early disseminated) occurs 1–4 months after the bite. The most common symptoms of untreated disease are pain and swelling of the joints, most commonly the knee (Lyme arthritis), facial palsy, meningitis, AV block.	Antibiotics are the treatment of choice. Amoxicillin, cefuroxime axetil, or erythromycin are most often used in children 8 years of age or younger. Doxycycline or tetracycline is given to children over the age of 8 years. A 4-week course of oral medication is given. If no response in 2–4 weeks, IV ceftriaxone, cefotaxime, or penicillin G is needed to prevent progression to later phases. (See drug guide for ceftriaxone.) Intravenous antibiotics are often required in the later stages of the disease. Relapse can occur. *Prognosis:* Lyme disease does not cause acute life-threatening illness, but it may result in significant morbidity, especially when chronic.	■ Children with early disease are usually treated at home. Children with progressive symptoms may be hospitalized. Use standard precautions. ■ Educate parents about the need for the long course of medications, informing them that the spirochete can go dormant. ■ Tell parents to have the child avoid sun exposure when taking doxycycline. Nonaspirin analgesics and antipyretics may provide relief of mild fevers, headaches, and muscle and joint aches. ■ Children with Lyme disease may tire easily. Promote rest and avoid vigorous activities that may be difficult. ■ Educate parents and children about the disease and early recognition of the symptoms. Teach them to safely remove ticks.

TABLE 12-5 Selected Infectious and Communicable Diseases in Children (continued)

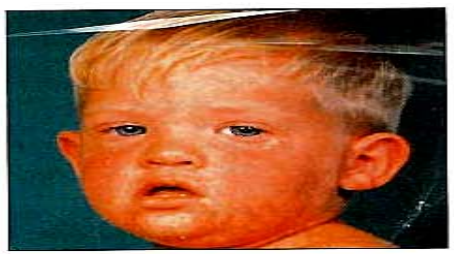
DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Mononucleosis *Causal agent:* Epstein-Barr virus (EBV), a member of the herpesvirus group. *Epidemiology:* Occurs worldwide. In developing countries, the disease occurs in young children and may be asymptomatic or mild. In developed countries, the disease is more common in older children and adolescents. *Transmission:* Direct contact with infected oropharyngeal and genital tract secretions. EBV can also be transmitted by blood transfusion. *Incubation period:* 30–50 days. *Period of communicability:* Virus is shed for up to 18 months after the clinical course of the disease.	In very young children mononucleosis may cause irritability, but be otherwise asymptomatic. A maculopapular rash may be seen in a few cases. In other children, the disease is characterized by malaise, headache, anorexia, abdominal pain, fatigue, and fever for 2–3 days, followed by lymphadenopathy and a sore throat. Hepatosplenomegaly may occur. Pain from swelling of the tonsils and lymph nodes may be significant. The syndrome typically lasts 2–3 weeks and is self-limited. *Complications:* Rare side effects include central nervous system symptoms such as encephalitis, aseptic meningitis, and Guillain-Barre syndrome. Splenic rupture, respiratory failure, and hematologic complications such as thrombocytopenia can also occur. In immunodeficient children, fatal infections or lymphomas can develop.	There is no specific treatment. Corticosteroids may be used to control tonsillar swelling and pain when there is impending airway obstruction. Antibiotics (penicillin or erythromycin) are used for secondary infections. A rash may develop with antibiotic treatment (Sullivan, 1999). *Prognosis:* After recovery, the virus remains latent in the lymphoid system. It can be reactivated during periods of immunosuppression. The child will be a virus carrier for life. *Prevention:* No known prevention.	■ Children are usually treated at home. Standard precautions should be used. ■ Give antipyretics and analgesics for fever and sore throat. Offer warm saltwater for gargling. Offer soft foods and encourage fluids. ■ Maintain bedrest. ■ Give adolescents a sense of responsibility by involving them in decisions about care whenever possible. Be sure to include parents and adolescents in discussions. ■ Reassure adolescents who may be worried about keeping up with schoolwork that they can return to school when the fever is gone and swallowing is normal. ■ Teens should avoid kissing until the fever has been gone several days. ■ Contact sports should be avoided until the liver and spleen are normal, usually in about 4 weeks.
Mumps (Parotitis)† *Causal agent:* A paramyxovirus. *Epidemiology:* Occurs worldwide in unvaccinated children, most often in winter and spring. Infection and vaccination induce lifelong immunity. Maternal antibodies begin to disappear in infants at the age of 12–15 months. *Transmission:* Saliva droplets and direct contact. *Incubation period:* 12–25 days. *Period of communicability:* 7 days before parotid swelling until 9 days after swelling subsides.	Malaise; low-grade fever; and earache, headache, malaise, pain with chewing, decreased appetite and activity; followed by bilateral or unilateral parotid gland swelling. Swelling peaks around the third day. Meningeal signs (stiff neck, headache, photophobia) occur in about 15% of patients. *Complications:* Orchitis (inflammation of the epidydimis, pain on testicular palpation, and scrotal swelling—most often unilateral) may occur in postpubertal males; sterility is relatively rare (Taber & Demmler, 1999). Oophoritis, pancreatitis, aseptic meningoencephalitis, and unilateral permanent deafness are sometimes seen.	There is no specific treatment. Therapy is supportive, focused on symptom relief. *Prognosis:* Mumps is usually self-limiting. *Prevention:* Mumps is a vaccine-preventable disease. The vaccine is usually administered in combination with measles and rubella vaccines (MMR) at 12–15 months of age and again at either 4–6 years or 11–12 years. This is a reportable disease.	■ Children are generally uncomfortable but are rarely very ill. They are usually cared for at home. ■ Use droplet precautions for hospitalized children while contagious. Avoid exposure to immunocompromised individuals or susceptible persons. ■ Keep children out of school or child care until all symptoms subside. Encourage diversional activities. ■ Give nonaspirin analgesics and antipyretics to control fever and pain. Give steroids if ordered. Encourage fluid intake. Swallowing and chewing may be painful. Offer soft and blended foods. Avoid foods and beverages that increase salivary flow (citrus, spices, and candies) because they cause pain. ■ Talking may be painful. Provide a bell or other attention-getting device. ■ Apply warm or cool compresses, whichever is preferred, to the parotid area. ■ Be alert for signs of complications. Headache, stiff neck, vomiting, and photophobia may indicate meningeal irritation. ■ Provide scrotal supports if testicular swelling occurs. ■ Reassure children who may be upset about the facial swelling that it will go away.

A B

This child has mumps with diffuse lymphedema of the neck. A, Side view. B, Front view.
Courtesy of Centers for Disease Control and Prevention, Atlanta, GA.

TABLE 12-5 Selected Infectious and Communicable Diseases in Children (continued)

DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Malaria (continued) *Period of communicability:* Not communicable except by blood or blood product transfusion, or the transplantation of organs from an infected person.	*Complications:* When more than 5% of red blood cells are infected, severe anemia is seen; seizures and cerebral malaria (increased intracranial pressure, confusion, stupor, coma, and sometimes death) are most common in children. Pulmonary edema, respiratory failure, renal failure, spontaneous bleeding, and shock are seen in older children and adolescents. Children with asplenia are at high risk for death. Causes 1–2 million deaths worldwide annually.	*Prevention:* Minimize contact with mosquitoes; use DEET insect repellent, screened rooms, and DEET-treated mosquito netting; and cover the body with clothing when traveling in endemic regions. Antimalarial chemoprophylaxis (mefloquine) should be used 1 week before arrival, weekly during travel, and 4 weeks after leaving the risk area. Doxycycline is sometimes used as an alternate chemoprophylaxis, but must be taken daily.	■ Educate families traveling to endemic areas about the importance of antimalarial chemoprophylaxis. Explain the need to take the medication correctly despite the common side effects of nausea and vomiting. Discuss the need to protect children during nocturnal feeding times of mosquitoes with protective clothing, mosquito repellent, and mosquito netting around the bed.
Measles (Rubeola)*† *Causal agent:* Mobillivirus, a member of the paramyxovirus group. *Epidemiology:* Occurrence peaks in the late winter and early spring. In developed countries, measles occurs mostly in outbreaks among children, which are largely the result of lack of immunization or possibly declining immunity. Many cases are imported from countries without routine immunization. Maternal immunity is active in the infant until the age of approximately 12–15 months. Vaccination induces lifelong immunity. In developing countries, measles remains largely an endemic problem and is a significant cause of infant and child morbidity and mortality. *Transmission:* Airborne, respiratory droplets and contact with infected persons. *Incubation period:* about 8–12 days. *Period of communicability:* Begins during the prodromal phase and ends about 2–4 days after the rash appears.	Children are quite ill in the 3–5-day prodromal phase, with symptoms including high fever, conjunctivitis, coryza, cough, anorexia, and malaise. Small, irregular, bluish white spots on a red background, called Koplik spots, appear on the buccal mucosa about 2 days before and after the onset of the rash. The characteristic red, blotchy, maculopapular rash that becomes confluent usually appears 2–4 days after onset of prodromal phase. The rash begins on the face and spreads to the trunk and extremities. Symptoms gradually subside in 4–7 days. Other symptoms include anorexia, malaise, fatigue, and generalized lymphadenopathy. *Complications:* Diarrhea, otitis media, bronchopneumonia, bronchitis, laryngotracheobronchitis, and encephalitis. Complications and sequelae occur most often in children who are malnourished, medically fragile, and immunosuppressed. The younger the child, the greater the risk for complications.	There is no cure for measles. Treatment is supportive. Antibiotics are used for bacterial secondary infections. *Prognosis:* Recovery is generally good with supportive care. *Prevention:* Measles is a vaccine-preventable disease. The measles vaccine is available alone (M), in combination with the rubella vaccine (MR), or in combination with the rubella and mumps vaccines (MMR). Immune globulin, administered up to 6 days after exposure, may be helpful in preventing the disease in susceptible persons (immunocompromised children, infants less than 1 year of age, pregnant women). All health care workers should have documented immunity. This is a reportable disease.	■ If the child is hospitalized, maintain airborne precautions during the contagious period (5 days after the rash appears). ■ Use a cool-mist vaporizer to help clear respiratory passages. ■ Suction nose and oral cavity very gently as necessary. ■ Give nonaspirin antipyretics for fever and antipruritics for itching. ■ Assess lungs carefully, especially in young children, in whom pneumonias are a common complication. ■ Antitussives may be ordered to control coughing. ■ Keep lights dim, and cover windows if the child has photophobia. ■ Elevate the head of the bed. Keep the room cool with good air circulation. Provide light, nonirritating blankets. ■ Keep skin clean and dry. No soaps should be used. ■ Maintain fluid intake. Offer cool liquids frequently in small amounts. Blended, pureed, and mashed foods are most easily tolerated. ■ Maintain bed rest. ■ Ensure visitors are immune to measles. ■ Provide diversions such as music, stories, and favorite toys.



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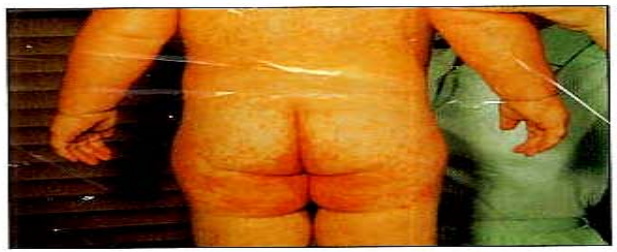
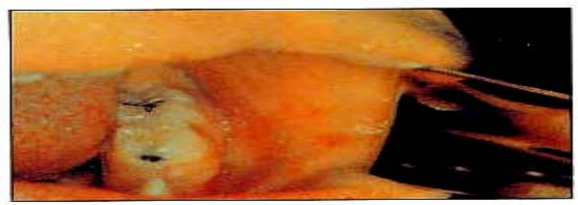


B

Measles, third day of rash. A, Facial rash. B. Posterior view.



Koplik spots on oral mucosa, fifth day of rash. *Courtesy of Centers for Disease Control and Prevention, Atlanta, GA.*

(continued)

TABLE 12-5 Selected Infectious and Communicable Diseases in Children (continued)

DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Pertussis (Whooping Cough)† *Causal agent:* Bordetella pertussis. *Epidemiology:* Occurs worldwide. Predominantly a childhood disease that is most common in children under 6 months of age. Epidemic cycles occur every 2–5 years. Pertussis also occurs in health care workers or adults who may have weakened or incomplete immunity. Adults may become only mildly ill but can spread the disease to unimmunized children. *Transmission:* Respiratory droplets and direct contact with discharge from the respiratory membranes. *Incubation period:* 7–21 days (commonly 7–10 days). *Period of communicability:* Begins approximately 1 week after exposure. Pertussis is communicable for 5–7 days after the initiation of antibiotic therapy. The disease is most contagious before the paroxysmal cough stage.	The onset is insidious. The disease begins with a runny nose, followed by an irregular, nonproductive cough. The cough becomes more severe at night and changes into spasms of paroxysmal coughing followed by inspiration, stridor, or "whooping." (Young infants do not manifest the "whooping.") The whoop sound results from forceful inhalation and a narrowed glottis. Sucking on a bottle may trigger the coughing spell. May be accompanied by flushing, cyanosis, vomiting, profuse drainage from the nose, eyes, and mouth. Dehydration may result from decreased oral intake. Paroxysmal coughing may last 1–4 weeks or more. *Complications:* Pneumonia, atelectasis, otitis media, and seizures.	Treatment consists of antibiotics (erythromycin and other macrolides), corticosteroids, if ordered, and supportive care. *Prognosis:* The disease is most severe in infants under 1 year of age, and most deaths occur in this age group. *Prevention:* Pertussis is a vaccine-preventable disease. Active immunization should be given in early infancy. Health care professionals who are in close contact with infected children before diagnosis may need antibiotics to prevent transmission. This is a reportable disease.	■ Use droplet precautions until 5–7 days after the initiation of antibiotics. Most hospitalized cases occur in children under the age of 5 years. ■ Closely monitor respirations and oxygen saturation. The smaller the child, the greater the risk for respiratory distress and apnea. ■ Remain with the child during coughing spells, when hypoxic and apneic episodes are most likely. Give oxygen if ordered. Have emergency equipment available. ■ Provide humidification. Gentle suctioning may be necessary. ■ Give nonaspirin antipyretics as needed for fever. ■ Encourage frequent rest periods. ■ Allow the child to eat desired foods. ■ Encourage the child to take fluids. The child may need IV hydration if oral intake is not tolerated. ■ Provide emotional support to parents. ■ Teach parents to watch for signs of respiratory failure and dehydration if the child is managed at home.
Pneumococcal infection† *Causative agent:* Streptococcus pneumoniae, a gram-positive diplococcus. *Epidemiology:* The organism is found in the pharynx of healthy people. Outbreaks occur in the winter and spring when people are more crowded in physical settings. In temperate climates, six serotypes account for most of the infections found in children. The disease is more common in African Americans, American Indians, and Native Alaskans. It occurs most commonly in the 6-month to 2-year age group. Of particular concern is the development of penicillin and multiantibiotic-resistant strains. *Transmission:* Respiratory secretions, and droplets. Upper respiratory infections help the spread. *Incubation period:* 1–3 days. *Period of communicability:* Unknown. Probably less than 24 hours after initiation of effective antibiotic therapy.	The signs and symptoms are related to the focal area of infection. The organism causes otitis media, sinusitis, pharyngitis, laryngotracheobronchitis, pneumonia, meningitis, and bacteremia. In otitis media, upper respiratory infection, fever, ear pain, and decreased appetite are seen. In bacteremia, there is unexplained fever and no localized infection site. In pneumonia, fever, chills, chest pain, dyspnea, malaise, and a productive cough are seen. In meningitis, inconsolable crying, increased irritability, lethargy, refusal to eat, nausea, vomiting, diarrhea, myalgia, photophobia, and seizures are seen. *Complications:* This organism is one of the leading causes of morbidity and mortality. It causes 85% of bacteremia, is the leading cause of meningitis, and is responsible for 40% of acute otitis media (Rennels, 1999). Other complications include septic arthritis, osteomyelitis, endocarditis, and brain abscess.	Penicillin is given for penicillin-sensitive strains, but up to 48% of infections are penicillin resistant. Macrolide antibiotics are used for mild disease if the child is allergic to penicillin. Penicillin-resistant strains are treated with third-generation cephalosporins (cefotaxime or ceftriaxone). Vancomycin and rifampen are used in combination when strains are resistant to antibiotics listed above (American Academy of Pediatrics, 2000). Symptomatic care is also provided. *Prognosis:* With rapid diagnosis and treatment recovery is generally good, but highly dependent on disease the organism caused and resistance of organism to antibiotics. *Prevention:* Many serotypes are preventable with immunization. Active immunization should begin in infancy with the 7-valent vaccine (Prevnar). In studies testing the efficacy of the vaccine, the new pneumococcal conjugate vaccine resulted in significant reduction in pneumonia, meningitis, bacteremia, and otitis media (Rennels, Edwards, & Keyserling, 1998). A 23-valent vaccine is available for older children at high risk of pneumococcal disease.	■ If the child is hospitalized, maintain standard precautions. ■ Provide nonaspirin antipyretics for control of fever and comfort. ■ Encourage fluids, and monitor intake and output. ■ Monitor vital signs and consciousness level to identify signs of worsening condition. ■ Educate parents about the need for the vaccine, as the unimmunized child could become infected with another serotype. ■ Many children with mild disease will be treated at home. Educate parents about signs indicating a need to seek additional medical care, the need for proper medication administration, and comfort measures for the child.

(continued)

TABLE 12-5 Selected Infectious and Communicable Diseases in Children (continued)

DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Poliomyelitis† *Causal agent:* There are three serotypes of poliovirus. *Epidemiology:* Occurs worldwide. Polio primarily affects children, although some cases involve transmission to immunocompromised or non-polio-protected adults caring for infants who had received live polio virus vaccine. The disease can be mild or severe. The vaccine induces lifelong immunity. The live poliovirus vaccine was associated with paralytic disease and is no longer recommended for routine immunization in the United States. *Transmission:* Primarily by the fecal-oral route, possibly respiratory. *Incubation period:* Usually 7–10 days (range 3–36 days). *Period of communicability:* Unknown. Infectious for up to several weeks before symptoms develop. The virus is shed in pharyngeal secretions for a few days and in the stool for several weeks.	Affects the central nervous system. Less severe infections may be limited to fever and stiffness in the neck and back, headache, vomiting, and sore throat. In other cases, fever, headache, stiff neck, Kernig or Brudzinski sign, decreased deep tendon reflexes, and progressive weakness occur. There may be respiratory difficulties, and an increased respiratory rate that may interfere with the ability to talk because frequent pauses are needed. Onset of paralysis may be sudden, in hours, or gradual over 3–5 days. Paralysis results from damage to neurons. *Complications:* Permanent motor paralysis, respiratory arrest, myocardial failure, aseptic meningitis, and post-polio syndrome.	Treatment is supportive. No chemotherapeutic agents that directly kill the polio virus are available. *Prognosis:* Respiratory complication is life threatening and involves 5%–10% of all cases. Respiratory paralysis may lead to death. *Prevention:* Poliomyelitis is a vaccine-preventable disease. Children should be immunized with the inactivated poliovirus vaccine (IPV) according to the recommended schedule. This is a reportable disease.	■ Use standard and droplet precautions in the hospital and keep the child on strict bedrest. ■ Observe closely for respiratory paralysis (ineffective cough, talking with frequent pauses, shallow and rapid respiratory rate). Have emergency equipment at bedside. Assist ventilations as needed until mechanical ventilation is set up. ■ Administer sedatives and nonaspirin analgesics as ordered to allow for rest and comfort. Most hot packs may relieve discomfort. ■ Encourage fluids. ■ Position the child to promote body alignment. ■ Perform range-of-motion exercises to prevent contractures after the acute phase. ■ Provide emotional support. ■ Patients are alert and aware. Tell them what is happening to them. ■ Long-term orthopedic (physical therapy) support may be needed by some children.
Rabies (Hydrophobia)* *Causal agent:* Rhabdoviridae, two types (urban, in dogs; wild, in wildlife). *Epidemiology:* Occurs worldwide. Urban rabies is generally controlled by vaccination of domestic animals susceptible to the infection, especially dogs and cats. Rabies can occur in many wild animals, particularly bats, foxes, skunks, and raccoons. *Transmission:* Infected saliva from bite of rabid animal. Virus enters the wound and travels along the nerves from point of entry to the brain where it multiplies and migrates along the efferent nerves to the salivary glands.	Children may be free of symptoms during the long incubation period. Initial acute symptoms include pain or paresthesia at the site of exposure along with headache, fever, loss of appetite, and malaise. Painful contractures in the muscles used for swallowing lead to hydrophobia (50% of patients), a reflex contraction at the sight of liquid. Neurologic symptoms such as hallucinations, disorientation, periods of excitability (mania) and quiet, and seizures later occur. Some patients may have confusion with or without agitation with progression to stupor and coma. Symptoms last about 2 weeks.	Immediately wash animal bites thoroughly with soap and water and irrigate well. Suturing should be avoided if possible. Human rabies immune globulin (HRIG) and human diploid cell rabies vaccine (HDCV) should be given to all persons bitten by animals that may be rabid. Half of the HRIG is infiltrated around the wound and the remainder is given IM. HRIG and HDCV can be delayed 48 hours if testing of the animal's brain is done (Phelps, 1997). The vaccine is of no value once rabies symptoms are present. *Prognosis:* If symptoms develop, no drug improves the prognosis.	■ Administer HRIG and HDCV as ordered. Assist family with obtaining help to find and quarantine the animal for observation. ■ Provide emotional support to the family while reinforcing the urgency for the vaccine and the need for a series of injections. ■ Inform parents and the child about the side effects of the vaccine—irritation at the injection site, itching, headache, muscle aches, nausea, and dizziness. ■ If the child acquires rabies, he or she will be hospitalized.

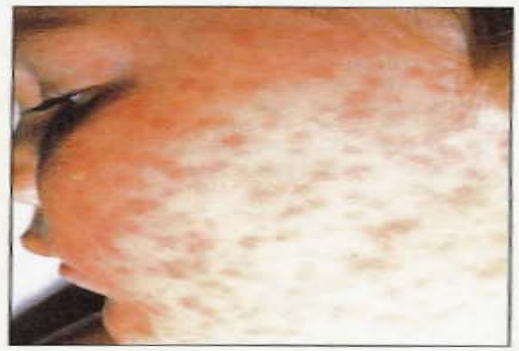
CLINICAL TIP

Any animal suspected of having rabies should be quarantined, if possible (Phelps, 1997). Rabies is diagnosed on the basis of history and clinical symptoms. The importance of history cannot be underestimated. Diagnosis is usually confirmed by fluorescent antibody staining of the dead animal's brain tissue.

*Indicates that a vaccine or antitoxin is available for use in high-risk or as-needed situations.
†Indicates that the disease has a safe and effective vaccine.

TABLE 12-5 Selected Infectious and Communicable Diseases in Children (continued)

DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Rabies (Hydrophobia)* (continued) *Incubation period:* Highly variable (3–7 weeks); average 6 weeks. This period depends on the amount of virus in the saliva, how close to the brain or major nerves the bite occurred, and how deeply the saliva penetrated the skin.	*Complications:* Usually results in death.	*Prevention:* Postexposure prophylaxis with HRIG and HDCV should be given as soon as possible after exposure. HDCV is repeated on days 3, 7, 14, and 28 after the bite (5 doses). The HDCV series may be stopped if the animal is found free of rabies. Expert advice on the administration of these vaccines is available from state and local health officials. Prevention also includes immunizing all domestic animals against rabies. Teach children to avoid contact with all unknown animals, dead or alive.	■ Institute standard and contact precautions. The virus is transmitted primarily in the saliva and cerebrospinal fluid. ■ Make the child as comfortable as possible. ■ Keep liquids out of sight of the hydrophobic child. ■ Use caution in the late stages of the disease when children are usually combative. Various medications, paralyzing agents, and sedatives may be used to provide relief. Coma and death occur after an exhaustive period of excitement and agitation that may last for days. ■ Provide emotional support to the family of the dying child.
Rocky Mountain Spotted Fever (Tickborne Typhus Fever, Sao Paulo Typhus) *Causal agent: Rickettsia rickettii,* a bacterium that is transmitted by infected ticks. *Epidemiology:* Rocky Mountain spotted fever (RMSF) occurs in most of the United States, southwestern Canada, and Mexico. In the United States, cases are most prevalent in the southeastern region. Nearly half of all cases occur in Oklahoma, North Carolina, South Carolina, and Tennessee, generally between April and September. Most infections occur in children who are less than 15 years of age. Infection induces immunity. *Transmission:* Transmitted by bites of ticks, principally dog ticks. There is no evidence of person-to-person transmission. *Incubation period:* 2–8 days (most commonly 7 days) after bite of an infected tick.	RMSF is a multisystem disease that can be mild, moderate, or severe. Onset may be gradual or rapid. Children may be very ill. Sudden onset is characterized by a moderate-to-high fever (40°C) that ordinarily lasts for 2–3 weeks, significant malaise, deep muscle pain, persistent headache, chills, and conjunctival injection. The characteristic rash, which usually appears between the third and fifth days, starts on the extremities, including the palms and soles, and moves to the trunk. Initially the rash is maculopapular and blanches with pressure. It later becomes petechial and more defined; it is rarely pruritic. The child may have splenomegaly, hepatomegaly, and jaundice. *Complications:* In severe cases bleeding from disseminated intravascular coagulation (DIC) can be significant. Gastrointestinal symptoms often occur early in the disease. Pulmonary complications, especially pneumonitis, are common and can become life threatening. Central nervous system involvement can cause significant encephalitis and overall severe neurologic dysfunction. Cardiac and renal complications can also occur, leading to shock in severe cases.	Treatment consists of antibiotics, such as chloramphenicol and doxycycline. *Prognosis:* Without early recognition and treatment, morbidity is significant and mortality in children is 4%–7% (Feigin & Bloom, 1999). If the rash occurs late or not at all, the disease is likely to be more severe. *Prevention:* Avoid areas that are heavily tick infested, and wear protective clothing. Check for ticks and if found remove promptly. Infected ticks must be attached and feeding for 4–6 hours to transmit the disease. Seek medical attention promptly for a child who has been bitten and becomes symptomatic.	■ Use standard precautions. ■ Children may require prolonged hospitalization, including monitoring in the intensive care unit. ■ Have hemodynamic monitoring equipment and emergency supplies readily available. ■ Administer antibiotics as ordered. ■ Observe for any abnormal bleeding. ■ Make the child as comfortable as possible. If the child is unconscious, support the extremities and keep the eyes closed and lubricated. ■ Provide quiet diversional activities. ■ Provide emotional support, and keep parents informed about the child's condition.

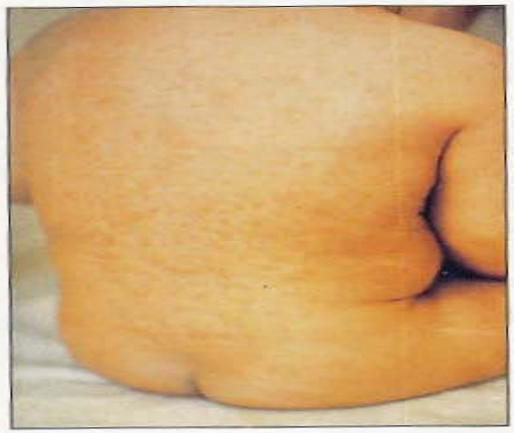


Rash of Rocky Mountain spotted fever.

(continued)

TABLE 12-5 Selected Infectious and Communicable Diseases in Children (continued)

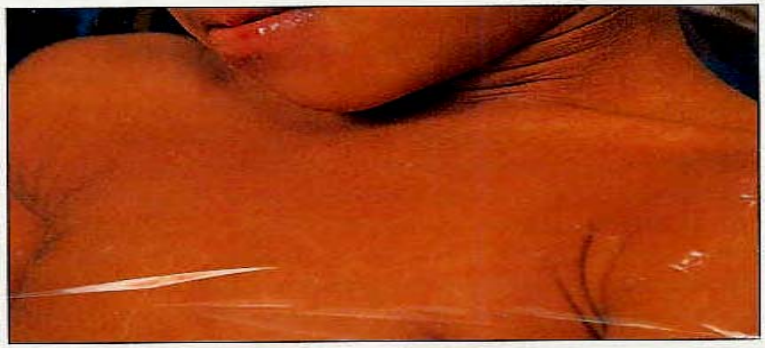
DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Roseola (Exanthem Subitum) *Causal agent:* Herpesvirus type 6 *Epidemiology:* Occurs worldwide, primarily in children 6–24 months of age during the spring and summer months. Maternal antibodies are present in infants at birth. *Transmission:* Unknown. A latent virus is probably shed by a caregiver in saliva. *Incubation period:* Appears to be 5–15 days. *Period of communicability:* Unknown, probably infectious but person-to-person spread is not reported.	Sudden, high fever up to 40.5°C (105°F) for 3–8 days, during which the child does not appear toxic (normal appetite and behavior). The fever phase is followed by a characteristic pale pink, discrete, maculopapular rash, which starts on the trunk and spreads to the face, neck, and extremities. The rash can last for 1–2 days. The child's appetite is normal. *Complications:* Children may have febrile seizures.	Roseola is self-limiting, and there is no treatment other than supportive care. *Prognosis:* Roseola is benign in most cases. *Prevention:* None	■ Children are rarely hospitalized, but if they are, use standard precautions. ■ Give nonaspirin antipyretics to control fever. ■ Observe closely for any seizure activity, especially during the acute febrile periods. ■ Encourage fluids. ■ Reassure parents that the rash will disappear in a few days.
Rubella (German Measles)† *Causal agent:* An RNA virus, member of the family Togaviridae, genus Rubivirus. *Epidemiology:* Occurs worldwide and is most prevalent in the winter and spring. Children are susceptible after loss of transplacentally acquired maternal antibodies about 6–9 months after birth. Natural infection or vaccination induces lifelong immunity. Most cases occur in the adults older than 20 years. Congenital rubella syndrome is most likely the result of lack of immunization rather than vaccine failure. Rates of congenital rubella syndrome have increased since 1989 because 25% of postpubertal women lack antibody to rubella virus (Taber & Demmler, 1999). *Transmission:* Droplet spread, direct contact with infected persons, or contact with articles soiled by nasal secretions. *Incubation period:* 14–21 days (most commonly 16–18 days). *Period of communicability:* From about 7 days before until about 4 days after the onset of the rash. Infants with congenital rubella may shed the virus for months after birth and should not be exposed or cared for by persons who are not immune to the disease.	Rubella is generally a mild disease with a characteristic pink, nonconfluent, maculopapular rash. The rash appears on the face, progresses to the neck, trunk, and legs, and disappears in the same order. Prodromal symptoms occur 1–5 days before the rash and include low-grade fever, headache, malaise, coryza, sore throat, and anorexia. Forschheimer spots (discrete, erythematous pinpoint or larger lesions on the soft palate) are seen during the prodromal phase. Generalized lymphadenopathy involving the postauricular, suboccipital, and posterior cervical areas is common up to 7 days before the rash. *Complications:* Rare, but include arthritis in adolescents, encephalitis, and congenital rubella syndrome.	Treatment is supportive. Rubella is generally self-limiting in children. *Prognosis:* Disease is usually mild and benign. Major risk is for fetus if the mother is infected in the first trimester. Spontaneous abortion, stillbirth, or fetal death are common (10% die after birth). Many other anomalies may be present, such as intrauterine growth retardation, cardiac, ear, and eye deficits. *Prevention:* Rubella is a vaccine-preventable disease. It is important that females of childbearing age be immunized because of the severe complications rubella poses to the fetus during the first trimester. All health care workers should have documented immunity.	■ Children are usually treated at home and rarely require hospitalization. They should not attend school or child care while contagious, and they should be isolated from pregnant women. School and child care facilities should be notified of the child's illness. ■ Maintain droplet precautions for contagious children. Maintain contact precautions for infants with congenital rubella syndrome until 1 year of age (American Academy of Pediatrics, 2000). ■ Give nonaspirin analgesics and antipyretics for any pain and fever. ■ Allow children to choose what they would like to eat and drink. Encourage fluids. ■ Provide quiet activities.



Discrete maculopapular erythematous rash of rubella.

TABLE 12-5 Selected Infectious and Communicable Diseases in Children (continued)

DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Streptococcus *Causal agent:* Group A streptococci (GAS). *Epidemiology:* The illness is caused by various M-protein groups of group A alpha- and beta- hemolytic streptococci. In recent years severe infections have appeared, in some cases threatening life and limb. Different strains are associated with pharyngeal and pyodermal infections. Pharyngeal infections tend to occur more in late fall, winter, and spring. Pyodermal infections tend to occur in warmer seasons because of the association with minor skin trauma and insect bites. *Transmission:* Airborne respiratory droplets, and direct contact. *Incubation period:* Pharyngeal: usually 2–5 days; Pyodermal: usually 7–10 days. *Period of communicability:* For weeks in untreated pharyngeal infections. The child is most contagious during the acute stage of the illness.	*Pharyngeal:* Onset is abrupt, with a sore throat, dysphagia, malaise, high fever, chills, headache, abdominal pain, anorexia, and vomiting. A beefy red pharynx with exudate (strep throat) and tender cervical nodes are present. Palatal petechia may be seen. A characteristic erythematous rash associated with scarlet fever appears in some cases 12–48 hours after onset of symptoms, starting on the neck and spreading to the trunk and extremities. In 3–4 days, the rash begins to fade and the tips of the toes and fingers begin to peel. The classic strawberry tongue is seen on day 4–5. *Pyodermal:* Lesions (impetigo) are honey-colored crusts at the site of open lesions. *Complications:* If untreated, retropharyngeal abscess, cervical lymphadenitis, acute rheumatic fever, acute glomerulonephritis, toxic shock syndrome, bacteremia, and necrotizing fascitis or myositis can occur.	Prompt antibiotic treatment is effective. Penicillin is the drug of choice. Erythromycin is used if the child is allergic to penicillin. The fever decreases after treatment is begun. Uncomplicated impetigo is treated with bacitracin or mupirocin ointment. Invasive strains causing necrotizing fasciitis or myositis need surgical intervention (exploration and debridement of dead tissue). Clindamycin may be needed for toxic shock syndrome and necrotizing fasciitis (McMillan & Feigin, 1999). *Prognosis:* Recovery is usually good with antibiotic therapy. Ten to 20% of school-age children become chronic carriers. *Prevention:* None.	■ Children with uncomplicated streptoccocal infections are usually cared for at home. Promote bedrest during the febrile stage. Give nonaspirin antipyretics to control fever. Teach parents important signs of a worsening condition. ■ For pharyngeal infections, offer warm saltwater for gargling; a soft diet and nonacidic beverages. Encourage fluids. Provide cool, clear liquids. Swallowing may be difficult. ■ Explain to parents the importance of the child's taking antibiotics for the full number of days prescribed. ■ Encourage other family members with sore throats to have throat cultures taken. ■ For impetigo, teach the parents to wash the skin, remove crusts, and apply antibiotic ointment. If the child is hospitalized, maintain droplet precautions for pharyngeal infections and contact precautions for skin lesions for 24 hours after beginning antibiotics. Monitor vital signs, especially temperature. Administer antibiotics as ordered. ■ If the child develops invasive streptococcal infection, use standard precautions. The child with toxic shock syndrome will need intensive care to manage shock and fluid and electrolyte imbalances.



Skin rash of scarlet fever.

TABLE 12-5 Selected Infectious and Communicable Diseases in Children (continued)

DISEASE	CLINICAL MANIFESTATIONS	CLINICAL THERAPY	NURSING MANAGEMENT
Tetanus *Causal agent: Clostridium tetani* or tetanus bacillus. *Epidemiology:* The bacillus is common and exists as a spore in soil, dust, and animal excretions. The organism produces an endotoxin that affects the central nervous system. *Transmission:* The organism is transmitted to humans through wounds in the skin from contact with contaminated soil or implements. Newborns can acquire tetanus via the umbilical cord if they are born in an unclean area or if a contaminated implement is used to cut the cord. *Incubation period:* 3 days–3 weeks (average 8 days). *Period of communicability:* Not communicable to other individuals except through skin wounds.	Stiffness of the neck and jaw, with painful facial spasms and difficulty swallowing over a few days. Noise or sudden movement may stimulate spasms. Localized prolonged and painful muscle contraction may occur at the site of the wound, and eventual rigidity of the abdomen and trunk. There is difficulty swallowing the increased oral secretions. Newborns have difficulty with sucking, progressing to an inability to suck, irritability, and nuchal rigidity. *Complications:* Laryngospasm, respiratory distress, death.	Tetanus immune globulin is given to unimmunized persons as soon as possible. Tetanus toxoid is given at the same time in a separate site. Medications are provided to treat muscle spasms. Intensive care is provided with cardiorespiratory monitoring, assisted ventilation, IV metronidazole or penicillin G, nutrition, and supportive care. Survival beyond 4 days indicates an increased chance of recovery. Paroxysms become less frequent and complete recovery may take weeks. *Prognosis:* 30% mortality; much higher in newborns. Intensive care has improved mortality. *Prevention:* Tetanus immunizations are routinely given. They must be updated every 10 years, or, if a potentially contaminated wound occurs, in 5 years. Proper surgical debridement of wounds decreases the chance of infection.	■ Prevent disease by checking immunization records and administering immunizations as necessary. ■ Give immune globulin to unimmunized persons. ■ Assist with wound debridement. ■ The child with tetanus is hospitalized. Use standard precautions. ■ Monitor the child's condition. Handle as little as possible. Reduce stimulation by placing child in a quiet, darkened room. ■ Offer skin and respiratory care. The child may need an endotracheal tube, suctioning, and supplemental oxygen for airway support. ■ Provide feedings via total parenteral nutrition or feeding tube. ■ Maintain hydration with IV fluids and electrolytes. ■ Try to reduce the child's anxiety, as mental status may be unaffected. ■ Prepare the family for a possible poor prognosis.

Interferences with Ventilation Human Immunodeficiency Virus Infection (HIV)

- **HIV** – Causative agent for end stage disease acquired immunodeficiency syndrome (AIDS)
  - Present prior to 1982
  - 1985 – HIV identified, antibody testing developed, & routes of transmission determined
  - 1987 – Drug therapy available & has since expanded
  - 1994 > – Lab testing to identify the viral load (# of HIV particles in the blood), new drugs, combination drug therapy, ability to test for antiretroviral drug resistance, tx to decrease the risk of passing from mother to infant

Interferences with Ventilation
Human Immunodeficiency Virus Infection

HIV

- **Occurrence**
  - US by 12/01
    - 810,000 AIDS cases diagnosed
    - 467,000 AIDS-related deaths
  - North America
    - 900,000 people living with HIV
    - 45,000 new infections annually
  - Globally
    - 42 million people living with HIV (3.2 million children)
      - **Subsaharan Africa the most devastated**
      - **Asia, Russia, Central America & South American - epidemics**

Interferences with Ventilation
Human Immunodeficiency Virus Infection

- **Transmission**
  - **HIV is a fragile virus – direct contact with infected body fluids**
    - Blood
    - Semen
    - Vaginal secretions
    - Breast milk
  - **Not spread casually – not transmitted through**:
    - Tears, saliva, urine, emesis, sputum, feces, or sweat
  - **Methods of transmission**
    - Sexual transmission
    - Contact with blood and blood products
    - Perinatal transmission

Interferences with Ventilation
HIV - Pathophysiology

- **HIV – RNA virus discovered in 1983**
  - Cannot replicate unless living inside a living cell
    - Viral RNA transcribes into a single strand of viral DNA with the assistance of **reverse transcriptase**
    - Copies itself & enters the cell's nucleus with the aid of an enzyme called integrase
    - Splices itself into a genome becomes a permanent part of the cell's genetic structure
      - **All replicated cells with be infected**
      - **The cell genetic codes will produce HIV**
  - **Initial infection – viremia**
  - **Targets CD4+T lymphocytes** – infected cells die within 2 days
    - Replication by budding
    - Fusion with other cells
    - Immune system: activation of the complement system – attack infected cells

Interferences with Ventilation
HIV – Clinical Manifestation

- **Acute Infection – Acute retroviral syndrome**
  - **Flulike fever, swollen lymph glands, sore throat, headache, malaise, nausea, muscle & joint pain, diarrhea, diffuse rash – 1-3 weeks after initial infection**
- **Chronic HIV Infection –**
  - **Early chronic – Interval between untreated HIV and dx of AIDS - about 10 years – asymptomatic disease: fatigue, headache, low-grade fever, night sweats, persistent generalized lymphadenopathy**
- **Intermediate chronic – CD4+T cell count drops to 200-500cells/ul – symptoms worsen**
  - **Oropharyngeal candidiasis (thrush)**
  - **Shingles, vaginal candidal infections, oral or genital herpes**
  - **Oral hairy leukoplakia – painless, white, raised lesions on lateral aspect of tongue**

Interferences with Ventilation
HIV – Clinical Manifestation

- **Late chronic infection or Diagnosis of AIDS –**
  - **Meet CDC Diagnostic Criteria**
    - **CD4+T cell count drops below 200 cells/ul**
    - **Development of one of the following opportunistic infections**
      - **Fungal – e. g., Pneumocystic carinii (PCP)**
      - **Viral – e.g., cytomegalovirus (CMV)**
      - **Protozoal: e.g., coccidiodomycosis**
      - **Bacterial: M. tuberculosis – any site**
    - **Development of one of the following opportunistic cancers:**
      - **Invasive cervical cancer, Kaposi's sarcoma, Burkitt's lymphoma**
    - **Wasting Syndrome – loss of 10% of idea body mass**
    - **Dementia develops**

14-2 Common Opportunistic Diseases Associated with AIDS*

ORGANISM/DISEASE	CLINICAL MANIFESTATIONS	DIAGNOSTIC TESTS	TREATMENT
Respiratory System			
Pneumocystis carinii pneumonia (PCP)	Nonproductive cough, hypoxemia, progressive shortness of breath, fever, night sweats, fatigue	Chest x-ray, induced sputum for culture, bronchoalveolar lavage specimen collection for cytology	trimethoprim–sulfamethoxazole (Bactrim), pentamidine (NebuPent), dapsone + trimethoprim, clindamycin (Cleocin) + primaquine, atovaquone (Mepron), trimetrexate (Neutrexin) + folinic acid + corticosteroids
Histoplasma capsulatum	Pneumonia, fever, cough, weight loss; disseminated disease	Sputum culture, serum or urine antigen assay	amphotericin B (Fungizone), itraconazole (Sporanox), fluconazole (Diflucan)
Mycobacterium tuberculosis	Productive cough, fever, night sweats, weight loss	Chest x-ray, sputum for AFB stain and culture	isoniazid (INH), ethambutol (Myambutol), rifampin (Rifadin), pyrazinamide (Pyrazinamide), streptomycin
Coccidioides immitis	Fever, weight loss, cough	Sputum culture, serology	amphotericin B (Fungizone), fluconazole (Diflucan), itraconazole (Sporanox)
Kaposi's sarcoma (KS)	Dyspnea, respiratory failure	Chest x-ray, biopsy	Cancer chemotherapy, α–interferon, radiation
Integumentary System			
Herpes simplex type 1 (HSV1) and type 2 (HSV2)	Mouth and nasal mucocutaneous ulcerative lesions (type 1), genital and perianal mucocutaneous ulcerative lesions (type 2)	Viral culture	acyclovir (Zovirax), famciclovir (Famvir), valacyclovir (Valtrex), foscarnet (Foscavir)
Varicella zoster virus (VZV)	Shingles, erythematous maculopapular rash along dermatomal planes, pain, pruritis	Viral culture	acyclovir (Zovirax), famciclovir (Famvir), valacyclovir (Valtrex), foscarnet (Foscavir)
Kaposi's sarcoma (KS)	Firm, flat, raised or nodular, hyperpigmented, multicentric lesions	Biopsy of lesions	Cancer chemotherapy, α–interferon, radiation of lesions, liquid nitrogen/cryotherapy for skin lesions
Bacillary angiomatosis	Erythematous vascular papules, subcutaneous nodules	Biopsy of lesions	erythromycin, doxycycline
Eye			
Cytomegalovirus (CMV) retinitis	Lesions on the retina, blurred vision, loss of vision	Ophthalmoscopic examination	ganciclovir (Cytovene), foscarnet (Foscavir), cidofovir (Vistide); valganciclovir (Valcyte), ganciclovir ocular implant (Vitrisert)
Herpes virus type 1 (HSV1)	Blurred vision, corneal lesions, retinal necrosis	Ophthalmoscopic examination	acyclovir (Zovirax), famciclovir (Famvir), valacyclovir (Valtrex), foscarnet (Foscavir)
Varicella zoster virus (VZV)	Progressive outer retinal necrosis (PORN), vision loss	Ophthalmoscopic examination	acyclovir (Zovirax), famciclovir (Famvir), valacyclovir (Valtrex), foscarnet (Foscavir)
Gastrointestinal System			
Cryptosporidium muris	Watery diarrhea, abdominal pain, weight loss, nausea	Stool examination, small bowel or colon biopsy	Antidiarrheals, paromomycin (Humatin), azithromycin (Zithromax), atovaquone (Mepron), octreotide (Sandostatin)
Cytomegalovirus (CMV)	Stomatitis, esophagitis, gastritis, colitis, bloody diarrhea, pain, weight loss	Endoscopic visualization, culture, biopsy, rule out other causes	ganciclovir (Cytovene), foscarnet (Foscavir), cidofovir (Vistide)
Herpes simplex type 1 (HSV1)	Vesicular eruptions on tongue, buccal, pharyngeal, or perioral esophageal mucosa	Viral culture	acyclovir (Zovirax), famciclovir (Famvir), valacyclovir (Valtrex), foscarnet (Foscavir)

Common Opportunistic Diseases Associated with AIDS—cont'd

ORGANISM/DISEASE	CLINICAL MANIFESTATIONS	DIAGNOSTIC TESTS	TREATMENT
Gastrointestinal System—cont'd			
Candida albicans	Whitish-yellow patches in mouth, esophagus, GI tract	Microscopic examination of scraping from lesion, culture	fluconazole (Diflucan), clotrimazole (Lotrimin), itraconazole (Sporanox), amphotericin B (Fungizone)
Mycobacterium avium complex (MAC)	Watery diarrhea, weight loss	Small bowel biopsy with AFB stain and culture	clarithromycin (Biaxin), rifampin (Rifadin), ciprofloxacin (Cipro), rifabutin (Mycobutin), amikacin, azithromycin (Zithromax)
Isospora belli	Diarrhea, weight loss, nausea, abdominal pain	Stool examination, bowel biopsy	trimethoprim-sulfamethoxazole (Bactrim), pyrimethamine + folinic acid
Salmonella	Gastroenteritis, fever, diarrhea	Blood and stool culture	ciprofloxacin (Cipro), ampicillin, amoxicillin, trimethoprim-sulfamethoxazole (Bactrim)
Kaposi's sarcoma (KS)	Diarrhea, hyperpigmented lesions of mouth and GI tract	GI series, biopsy	Cancer chemotherapy, α-interferon, radiation
Non-Hodgkin's lymphoma	Abdominal pain, fever, night sweats, weight loss	Lymph node biopsy	Chemotherapy
Neurologic System			
Toxoplasma gondii	Cognitive dysfunction, motor impairment, fever, altered mental status, headache, seizures, sensory abnormalities	MRI, CT scan, toxoplasma serology, brain biopsy (usually deferred)	pyrimethamine + folinic acid + sulfadiazine, clindamycin (Cleocin), azithromycin (Zithromax), clarithromycin (Biaxin)
JC papovavirus	Progressive multifocal leukoencephalopathy (PML), mental and motor declines	MRI, CT scan, brain biopsy	Effective antiretroviral therapy may help
Cryptococcal meningitis	Cognitive impairment, motor dysfunction, fever, seizures, headache	CT scan, serum antigen test, CSF analysis	amphotericin B (Fungizone), fluconazole (Diflucan), itraconazole (Sporanox), flucytosine (Ancobon)
CNS lymphomas	Cognitive dysfunction, motor impairment, aphasia, seizures, personality changes, headache	MRI, CT scan	Radiation, chemotherapy
AIDS-dementia complex (ADC)	Insidious onset of progressive dementia	CT scan	Effective antiretroviral therapy may help

Interferences with Ventilation
HIV – Diagnostic Studies

- **HIV-specific antibody testing**
  - 2 month delay after infection before antibodies can be detected
- **CD4+T cell count**
- **Viral load cells counts**
- **CBC – anemia/ decreased WBC**

Interferences with Ventilation
HIV – Medical Management

- **Drug Therapy Goals**:
  - Decrease HIV RNA levels to < 50 copies/ul
  - Maintain or raise CD4+T cell counts to 800-1200cells/ul
  - Delay the development of HIV-related symptoms & opportunistic diseases
- Medication Actions:
  - Antiretroviral drugs that work at various points in the HIV replication cycle
  - No cure – delay of disease progression
  - **Types of medications:**
    - Nucleoside reverse transcriptase inhibitors
    - Nonnucleoside reverse transcriptase inhibitors
    - Nucleotide reverse transcriptase inhibitors
    - Protease inhibitors
    - Fusion inhibitors
  - Drug Therapy for opportunistic diseases associated with AIDS

Interferences with Ventilation
HIV – Nursing Management

- **Assess:** Total health history & assessment; signs and symptoms of opportunistic diseases, infections, or cancer

- **Nsg Action**: Supportive care for any disease, infection, or cancer

- **Pt Education**: Health promotion; self-protection & protect others from the disease; risk reducing sexual activities—barrier use—oral, vaginal, anal; abstain from illicit drug use; HIV testing counseling; measures to support adherence to drug therapy;

Interferences with Ventilation

- **To prevent TB, Clients with HIV infection who have less than 10-mm induration on the TB skin test and no clinical symptoms would receive which of the following medications for a period of 12 months?**
  - **A. Bacille Calmette-Guerin (BCG) vaccine**
  - **B. Isoniazid (INH)**
  - **C. Ethambutol**
  - **D. Streptomycin**

Interferences with Ventilation

- **Identify seven of the most common symptoms of HIV.**

Interferences with Ventilation

- **HIV can be transmitted by what routes?**
  - **A. Viral contact, sexual contact, and parenteral contact**
  - **B. Parenteral contact, airborne contact, and perinatal contact**
  - **C. Sexual contact, parenteral contact, and perinatal contact**
  - **D. Perinatal contact, sexual contact, and viral contact**

Interferences with Ventilation