

**Project:** Ghana Emergency Medicine Collaborative

**Document Title:** Typhoid Fever, Infectious Diarrhea, Diphtheria, and Pertussis

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# Typhoid Fever

- Typhoid fever is a life-threatening illness caused by the bacterium *Salmonella Typhi*
- *Salmonella Typhi* lives only in humans
- Persons with typhoid fever carry the bacteria in their bloodstream and intestinal tract
- Transmitted through the ingestion of food or drink contaminated by the feces or urine of infected people



High endemicity



Medium endemicity



Sporadic outbreaks

Countries endemic for typhoid  
(U.S. CDC 2006)

# Symptoms

Symptoms usually develop 1–3 weeks after exposure, and may be mild or severe

## FIRST WEEK:

- High fever 103 or 104 F (39.4 or 40 C)
- Malaise
- Headache
- Constipation (adults) or diarrhea (children)
- Rose-colored spots on the chest
- Enlarged spleen and liver
- Healthy carrier state may follow acute illness

# Symptoms

## SECOND WEEK:

- Continuing high fever
- Either diarrhea that has the color and consistency of pea soup, or severe constipation
- Considerable weight loss
- Extremely distended abdomen

## THIRD WEEK:

- Become delirious
- Lie motionless and exhausted with your eyes half-closed in what's known as the typhoid state
- Life-threatening complications often develop at this time

# Symptoms

## FOURTH WEEK:

- Improvement may come slowly during the fourth week
- Fever is likely to decrease gradually until your temperature returns to normal in another week to 10 days
- Signs and symptoms can return up to two weeks after fever has subsided

# Complications

- Intestinal bleeding or perforation — may develop in the third week of illness
  - sudden drop in blood pressure and shock
  - followed by the appearance of blood in your stool
  - severe abdominal pain, nausea, vomiting and bloodstream infection



# Diagnosis

- Confirmed by identifying *S. typhi* in a culture of your blood or other body fluid or tissue
- Body fluid or tissue culture - small sample of blood, stool, urine or bone marrow is placed on a special medium that encourages the growth of bacteria
- Bone marrow culture often is the most sensitive test for *S. typhi*

# Treatment of Typhoid Fever

- Antibiotic therapy is the only effective treatment for typhoid fever
  - Ciprofloxacin
  - Ceftriaxone
- Supportive therapy
  - Drinking fluids. This helps prevent the dehydration that results from a prolonged fever and diarrhea
  - Healthy diet. Non bulky, high-calorie meals help replace the nutrients patients lose when they're sick

# Prevention

- Vaccines against typhoid fever are available, but they're only partially effective
- One is injected in a single dose, and the other is given orally over a period of days
- Neither vaccine is 100 percent effective, and both require repeat immunizations as vaccine effectiveness diminishes over time

# Nursing Care

Disinfection of feces, urine, vomitus, bath water, dishes, linen, secretions from nose & throat

## Contact Precautions

- Private room. Door may remain open.
- Put gloves on when you enter the room. Remove gloves before leaving the room and place in trash. Clean your hands.
- Put gown on before entering room. Remove gown in room and place in trash.
- Hand hygiene before AND after contact with patient and/or anything in room.
- Dedicated equipment such as stethoscope and blood pressure cuff.

\*\* Visitors please check in at desk before entering room.

# Nursing Management

- Follow contact precautions, wash hands thoroughly before & after any patient exposure
- Continue contact precautions until 3 consecutive stool cultures are negative
- Strict I/O's
- Monitor the pt for bowel perforation
  - Sudden pain in lower right abd & rebound tenderness
  - One or more rectal bleeding episodes
  - Sudden hypotension
  - Increasing heart rate

# Nursing Management

- Maintain IV access for fluids & electrolytes
- Encourage high-calorie foods/fluid
- Watch for constipation
- Restrain from administering antipyretics which can mask fever
- Report to public health official



# Patient Teaching

- Explain causes of salmonella infection
- Show the patient proper hand washing techniques
- Tell pt to cook foods thoroughly & refrigerate promptly
- Avoid cross-contamination of food
- Wash fruits & vegetables thoroughly
- Educate the patient to report dehydration, bleeding or recurrence of symptoms
- Encourage those close to the patient to get examined
- Those high at risk should be vaccinated

# Infectious Diarrhea



# Infectious Diarrhea

Diarrhea caused by an infection of the digestive system cause by a bacterium, virus, or parasite that results in frequent bowel movements producing excessive amounts of liquid feces

- Second leading cause of death in children under five years old
- Kills 1.5 million children every year (WHO)
- Leading cause of malnutrition in children under five years old (WHO)
- Kills 5-10 million people/year (WHO)

# Common Causes of Diarrhea

- Bacterial infections
  - Several types of bacteria consumed through contaminated food or water; *Campylobacter*, *Salmonella*, *Shigella*, *Clostridium difficile* and *Escherichia coli* (*E. coli*)
- Viral infections
  - Many viruses cause diarrhea, including rotavirus, norovirus, cytomegalovirus, herpes simplex virus, and viral hepatitis
  - Infection with the rotavirus is the most common cause of acute diarrhea in children. Rotavirus diarrhea usually resolves in 3 to 7 days but can cause problems digesting lactose for up to a month or longer.
- Parasites
  - Parasites that cause diarrhea include *Giardia lamblia*, *Entamoeba histolytica*, and *Cryptosporidium*

# Common Causes of Diarrhea

- Intestinal diseases
  - Inflammatory bowel disease, ulcerative colitis, Crohn's disease, and celiac disease
  - Food intolerances and sensitivities such as lactose, wheat, etc.
- Reaction to medicines
  - Antibiotics, cancer drugs, and antacids containing magnesium can all cause diarrhea.

# Risks of Infectious Diarrhea

- Lack of safe water supply
- Contaminated food
- Overcrowding
- Poor sanitation
- Malnutrition

# Symptoms

- Symptoms usually begin with abdominal pain followed by diarrhea that usually lasts no more than a few days
  - Frequent stools
  - Watery stools
  - Fever
  - Chills
  - Anorexia
  - Vomiting
  - Malaise

# Symptoms

Signs of dehydration in adults include

- thirst
- less frequent urination than usual
- dark-colored urine
- dry skin
- fatigue
- dizziness
- light-headedness

# Symptoms

Signs of dehydration in infants and young children include

- dry mouth and tongue
- no tears when crying
- no wet diapers for 3 hours or more
- sunken eyes, cheeks, or soft spot in the skull
- high fever
- listlessness or irritability

# Symptoms

Dehydration is particularly dangerous in children, older adults, and people with weakened immune systems





# Diagnosis

Diagnostic tests to find the cause of diarrhea may include the following:

- Medical history and physical examination
- Stool culture to check for bacteria, parasites, or other signs of disease and infection.
- Blood tests can be helpful in ruling out certain diseases

# Diagnosis

- Sigmoidoscopy or colonoscopy may be used to look for signs of intestinal diseases that cause chronic diarrhea
- Fasting tests find out if a food intolerance or allergy is causing the diarrhea

# Treatment

- Adequate fluid and electrolyte replacement and maintenance are key to managing diarrheal illnesses



# Patient Education

- Tell the pt to avoid caffeine and foods that are greasy, high in fiber, or sweet may lessen symptoms. These foods can aggravate diarrhea
- Infants with diarrhea should be given breast milk or full-strength formula as usual, along with oral rehydration solutions
- Some children recovering from viral diarrheas have problems digesting lactose for up to a month or more

# Preventions

There are two oral vaccines:

- Rotavirus vaccine, live, oral, pentavalent (RotaTeq); and rotavirus vaccine, live, oral (Rotarix). RotaTeq is given to infants in three doses at 2, 4, and 6 months of age
- Rotarix is given in two doses. The first dose is given when infants are 6 weeks old, and the second is given at least 4 weeks later but before infants are 24 weeks old

# Diphtheria

# Diphtheria

- Acute infectious disease caused by the bacteria *Corynebacterium diphtheria*
- Incubation period 2-5 days (range, 1-10 days)
- May involve any mucous membrane
- Classified based on site of infection
  - Anterior nasal
  - Tonsillar and pharyngeal
  - Laryngeal
  - Cutaneous
  - Ocular
  - Genital

# Pharyngeal and Tonsillar Diphtheria

- Insidious onset of exudative pharyngitis
- Exudate spreads over 2-3 days and may form adherent membrane
- Membrane may cause respiratory obstruction
- Fever usually not high but patient appears toxic



# Transmission

- Spread most often by direct person- to-person transmission by contact with respiratory secretions (coughing or sneezing) and cutaneous lesions
- Cutaneous lesions are important in transmission particularly in countries warm climates
- toxins destroy healthy tissue in the throat around the tonsils, or in open wounds in the skin, causing the telltale gray or grayish green membrane to form

# Clinical Presentation

Symptoms of diphtheria are caused by toxins produced by the diphtheria bacillus

1. Nasal diphtheria - common cold with watery or bloody nasal discharge
2. Tonsillar (pharyngeal diphtheria) - malaise, anorexia, sore throat, low grade fever, adherent white or gray membrane
3. Laryngeal diphtheria - fever, hoarseness of voice, cough, airway obstruction, cyanosis

Severe cases will develop toxemia, septic shock, death within 6-10 days

# Diagnosis

- Diphtheria must be treated quickly therefore diagnosis is based on visible symptoms
- Patient's eyes, ears, nose, and throat are examined to rule out other diseases that may cause fever and sore throat
- The most important single symptom suggesting diphtheria is the membrane - when a patient develops skin infections during a diphtheria outbreak, the doctor will consider the possibility of cutaneous diphtheria and take a smear to confirm the diagnosis

# Complications

- Cardiac involvement is thought to be responsible for 50-60% of deaths associated with diphtheria
- First sign of toxin-induced myocardiopathy is tachycardia
- Disturbances in the heart rhythm may culminate in heart failure
- A variety of dysrhythmias,
  - first-, second-, or third-degree heart block
  - atrioventricular dissociation;
  - ventricular tachycardia can develop

# Complications

- Symptoms involving the nervous system can include:
  - Painful or difficult swallowing
  - Slurred speech or loss of voice
  - The exotoxin may also cause severe swelling in the neck ("bull neck")



# Complications

- Cardiac involvement is thought to be responsible for 50-60% of deaths associated with diphtheria
- First sign of toxin-induced myocardopathy is tachycardia disproportionate to the degree of fever
  - CHF may be a consequence of myocardial inflammation
- A variety of dysrhythmias,
  - first-, second-, or third-degree heart block
  - atrioventricular dissociation;
  - ventricular tachycardia can develop
- Echocardiogram may demonstrate dilated or hypertrophic cardiomyopathy

# Treatment

- The most important step is prompt administration of diphtheria antitoxin, without waiting for laboratory results
  - The antitoxin is made from horse serum and works by neutralizing any circulating exotoxin
- Antibiotics (penicillin, ampicillin, or erythromycin) are given to wipe out the bacteria, prevent spread of the disease, and to protect the patient from developing pneumonia, but they are not a substitute for treatment with antitoxin

# Nursing Management

The aims of treatment are to inactivate toxin, to kill the organism, and to prevent respiratory obstruction

1. Strict bed rest, strict isolation
2. Cleansing throat gargle may be ordered
3. Liquid or soft diet or parenteral fluid
4. Observe for respiratory obstruction (tracheotomy).
5. Suction as needed
6. Oxygen therapy
7. Antitoxin is given against toxin
8. Toxoid is given to immunized contact
9. Broad spectrum antibiotic is given against diphtheria bacilli.



# Nursing Management

- Cutaneous diphtheria is usually treated by cleaning the wound with soap and water, and giving the patient antibiotics for 10 days
- Patients with laryngeal diphtheria are kept in a croup tent or high-humidity environment; they may also need throat suctioning or emergency surgery if their airway is blocked

# Isolation Precautions

- Patients must be on Droplet isolation for one to seven days or until two successive cultures show that they are no longer contagious

## Droplet Precautions

- Private room. Door may remain open.
- Surgical mask upon room entry. Surgical mask on patient before transport. Surgical mask on visitors before entering room.
- Wear eye protection when performing procedures that may generate aerosols.
- Hand hygiene before AND after contact with patient and/or anything in room.
- Wear a gown and gloves when anticipating secretions – remove gown and gloves before leaving room.

\*\* Visitors please check at desk before entering room.

# Isolation Precautions

- Diphtheria is highly contagious and has a short incubation period, family members and other contacts of diphtheria patients must be watched for symptoms and tested to see if they are carriers
- They should be given antibiotics for seven days and a booster shot of diphtheria/tetanus toxoid.

# Prevention

- The standard course of immunization for healthy children is three doses of DPT (diphtheria-tetanus-pertussis) preparation given between 2 mo and 6 mo of age, with booster doses given at 18 months and at entry into school
- Adults should be immunized at 10 year intervals with Td (tetanus-diphtheria) toxoid.

# Pertussis

# Pertussis

- Pertussis (whooping cough) highly contagious acute bacterial infection of the respiratory tract that is caused by *Bordetella pertussis*
- Pertussis is the only disease for which universal childhood vaccination is recommended

# Transmission

- Only found in humans 30–50 million pertussis cases and about 300,000 deaths per year (CDC.gov)
- Spread from person to person by coughing or sneezing while in close contact with others

# Symptoms of Pertussis

Early infection starts with cold-like symptoms that develops 7-10 days after exposure:

- Runny nose
- Low-grade fever (generally minimal throughout the course of the disease)
- Mild, occasional cough
- Apnea — a pause in breathing (in infants)
- Infection starts with cold-like symptoms and maybe a mild cough or fever



# Symptoms of Pertussis

As the disease progresses, the traditional symptoms of pertussis appear and include:

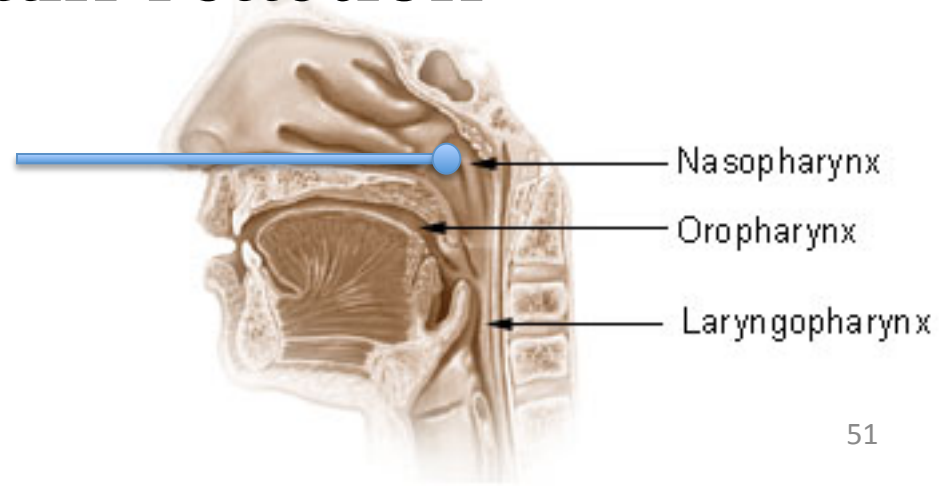
- Paroxysms (fits) of many, rapid coughs followed by a high-pitched "whoop"
- Vomiting
- Exhaustion from coughing fits that can go on for up to 10 weeks

# Complications

- Serious and sometimes life-threatening complications in infants and young children
  - Pneumonia
  - Apnea
  - Encephalopathy
  - Death
- Teens & Adults
  - Weight loss
  - Loss of bladder control
  - Passing out
  - Rib fractures from severe coughing

# Diagnosis

- Signs & symptoms
- Physical examination
- Lab test-sample of secretions from the back of the throat through the nose
- Blood test to detect *B. pertussis* DNA by polymerase chain reaction



# Treatment

Recommended treatment —

- Macrolide antibiotic
  - 5-day course of azithromycin
  - 7-day course of clarithromycin
  - 14-day course of erythromycin
- Alternative agent — 14-day course of trimethoprim-sulfamethoxazole
- Treat persons aged  $>1$  year within 3 weeks of cough onset
- Treat infants aged  $< 1$  year within 6 weeks of cough onset

# Prevention

Post exposure prophylaxis —

- Administer course of antibiotic to close contacts within 3 weeks of exposure, especially in high-risk settings
- Vaccinate children:
  - First three shots are given at 2, 4, and 6 months
  - The fourth shot is given between 15 and 18 months of age
  - Fifth shot is given before a child enters school, at 4–6 years of age
- Recommend a single dose of Tetanus Toxoid and Reduced Diphtheria and Acellular Pertussis vaccine (Tdap) for adolescents and adults aged <65 years.

# Nursing Management

1. Droplet Isolation
2. Bed rest, mental rest
3. Provide restful environment and reduce factors that promote paroxysm(dust, smoking)
4. Encourage fluid ,small frequent feeding.
5. Increase humidity
6. Observe for signs of air way obstruction
7. Small amount of sedatives may be necessary to quiet the child.
8. Protect the child from secondary infection ,antibiotics may be given to treat secondary infection
9. Pertussis immune antiserum may be given

# Patient Education

Manage pertussis and reduce the risk of spreading it to others by:

- Following the schedule for giving antibiotics exactly as your doctor prescribed
- Keeping your home free from irritants - as much as possible - that can trigger coughing, such as smoke, dust, and chemical fumes
- **Report any signs of dehydration to your doctor immediately** - dry, sticky mouth, sleepiness or tiredness, thirst, decreased urination or fewer wet diapers, few or no tears when crying, muscle weakness, headache, dizziness or lightheadedness

# Patient Education

- Drinking plenty of fluids, including water, juices, and soups, and eating fruits to prevent dehydration
- Practice good hand washing techniques
- Eating small, frequent meals to help prevent vomiting if occurring.