Epidemiology of Communicable Diseases
Diphtheria

Diphtheria
Is an acute bacterial infection that spreads easily and occurs quickly. It mainly affects the mucous membrane of the upper respiratory tract (nose, tonsils, pharynx, larynx) skin, or may involve any mucous membrane (conjunctiva, vagina, or ear). The characteristic lesion caused by reaction to a potent exotoxin, is an asymmetrical adherent greyish white membrane with surrounding inflammation. In moderate to severe cases of resp. diphtheria, the throat may be moderately to severely sore with enlarged and tender cervical lymph nodes and together with marked swelling of the neck, can give rise to a (bull neck) appearance.

Classification based on site of infection:
- anterior nasal
- pharyngeal and tonsillar
- laryngeal
- cutaneous
- ocular
- genital

Occurrence:
A disease of colder months in temperate zones primarily involving non immunized or under immunized children below 15 years of age. People living in crowded or unclean conditions, those who aren't well nourished.
- children and adults who don't have up-to-date immunizations. (low vaccination coverage).
In tropics, a seasonal trends are less distinct, inapparent, cutaneous and wound diphtheria cases are much more common.

Diphtheria epidemic can occure in susceptible population. is rare in the United States and Europe, where health officials have been immunizing children against it for decades. However, it's still common in developing countries.
In Ecuador, an outbreak of about 200 cases occurred in 1993 and 1994, about 50% cases occurred in persons aged 15 years or older, epidemic control was achieved through mass immunization campaigns.

Etiology:
Corynebacterium diphtheriae is an irregularly staining, gram-positive, nonspore-forming, nonmotile pleomorphic bacillus.

Signs and Symptoms:
In its early stages, diphtheria can be mistaken for a bad sore throat. A low-grade fever and swollen neck glands are the other early symptoms.

The toxin, or poison, caused by the bacteria can lead to a thick coating in the nose, throat, or airway. This coating is usually fuzzy gray or black and can cause breathing problems and difficulty in swallowing.

The formation of this membrane makes a diphtheria infection different from other more common infections (such as strep throat) that cause sore throat.

As the infection progresses, the person may:
- have difficulty in breathing or swallowing
- complain of double vision
- have slurred speech
- even show signs of going into shock (skin that's pale and cold, rapid heartbeat, sweating, and an anxious appearance)

In cases that progress beyond a throat infection, can lead to potentially life-threatening complications that affect:
- Heart (myocarditis) and kidneys
- Nerve (neuritis), eventually leading to paralysis.

Up to 40% to 50% of those who don't get treated can die.

Diphtheria Complications
Most attributable to toxin
Severity generally related to extent of local disease
Most common complications are myocarditis and neuritis
Death occurs in 5%-10% for respiratory disease

Susceptibility:
Infant borne to immune mothers have passive protection which is usually before the 6th months.

In apparent infection may induce long-lasting or life long immunity. Immunization with dipht. Toxoid, produce prolonged but not lifelong
Immunity wanes with increased age. Immunity induced by diphtheria toxoid protect against toxin-mediated systemic disease but not against colonization in nasopharynx.

**Diagnostic tests:**
Specimens for culture should be obtained from the nose or throat or any mucosal or cutaneous lesion.
Material should be obtained from beneath the membrane, or a portion of the membrane itself should be submitted for culture.

**Prevention:**
Educational measures

2) Preventing diphtheria depends almost completely on immunizing children with the diphtheria/tetanus/pertussis (DTP) or DTaP diphtheria/tetanus/acellular pertussis antigen vaccine non-immunized adults with the diphtheria/tetanus vaccine (DT).
Most cases of diphtheria occur in people who haven't received the vaccine at all or haven't received the entire course.

The immunization schedule
DTP vaccines at 2, 4, and 6 months of age
booster dose given at 12 to 18 months
booster dose given again at 4 to 6 years
booster shots given every 10 years after that to maintain protection

Diphtheria Toxoid
Formalin-containing diphtheria toxoid
Schedule Three or four doses + booster
   Booster every 10 years

Efficacy Approximately 95%
Duration Approximately 10 years

Should be administered with tetanus toxoid.
Although most children tolerate it well, the vaccine sometimes causes mild side effects such as redness or tenderness at the injection site, a low-grade fever.
Severe complications, such as an allergic reaction, are rare.

Diphtheria and Tetanus Toxoids Adverse Reactions:
Local reactions (erythema, induration)
Exaggerated local reactions.
Fever and systemic symptoms not common
Severe systemic reactions are rare.
Diphtheria and Tetanus Toxoids Contraindications and Precautions:
Severe allergic reaction to vaccine component or following a prior dose

Moderate or severe acute illness

Contagiousness:
Diphtheria is highly contagious. It's easily passed from the infected person to others through sneezing, coughing, or even laughing. It can also be spread to others who pick up tissues or drinking glasses that have been used by the infected person.

People who have been infected by the diphtheria bacteria can infect others for up to 4 weeks, even if they don't have any symptoms. There are chronic carriers who may shed the organisms for 6 months or more.
The incubation period for diphtheria is 2 to 4 days, although it can range from 1 to 6 days.

Diphtheria Epidemiology

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<th>Reservoir</th>
<th>human carriers</th>
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<td>Usually asymptomatic</td>
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<tr>
<th>Transmission</th>
<th>Respiratory</th>
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<td>Skin and fomites</td>
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| Incubation period      | 2-5 days                        |
| Temporal pattern       | Winter and spring               |
| Communicability        | without antibiotics Up to several weeks |

Treatment

Children and adults with diphtheria are treated in a hospital. After a doctor confirms the diagnosis through a throat culture, the infected person receives a special anti-toxin, given through injections or through an IV, to neutralize the diphtheria toxin already circulating in the body, as well as antibiotics to kill the remaining diphtheria bacteria. Immediate hospitalization and early intervention allow most patients to recover from diphtheria. After the antibiotics and anti-toxin have taken effect, someone with diphtheria will need bed rest for a while (4 to 6 weeks, or until full recovery).
Bed rest is particularly important if the person's heart has been affected by the disease. (Myocarditis)

Those who have recovered should still receive a full course of the diphtheria vaccine to prevent a recurrence. because the occurrence of disease doesn't guarantee lifetime immunity.

**CONTROL MEASURES:**
*Local public health officials should be notified promptly
*Identification of close contacts of a person suspected to have diphtheria.
*For close contact, regardless of their immunization status, the following measures should be taken:
    * Surveillance for 7 days for evidence of disease.
    * Culture for C. diphtheria.
    * Antimicrobial prophylaxes with oral erythromycin.

Follow up:
Pharyngeal culture should be obtained from contacts proven to be carriers at a minimum of 2 weeks after completion of therapy.
If cultures are positive, an additional 10-day therapy of erythromycin should be given.