

INFECTIONS THROUGH THE RESPIRATORY TRACT

****Infective agent's**

*** viral infections**

****Transmission**

*** Bacterial infections**

****Host**

***Fungal infections**

****Control of air-borne infections**

<p>Viral infections Measles (measles virus) Rubella (rubella virus) Mumps (mumps virus) Influenza (influenza viruses) Acute upper respiratory tract infection (rhinoviruses, reoviruses, enteroviruses) Infectious mononucleosis (Epstein–Barr virus) Chickenpox* (varicella-zoster virus)</p> <p>Rickettsial infections Q fever* (<i>Coxiella burnetii</i>)</p> <p>Bacterial infections Tuberculosis (<i>Mycobacterium tuberculosis</i>) Pneumococcal pneumonia (<i>Streptococcus pneumoniae</i>) Other pneumonias (<i>Streptococcus pyogenes</i>, <i>Staphylococcus aureus</i>, <i>Klebsiella pneumoniae</i>, <i>Haemophilus influenzae</i>) Psittacosis (<i>Chlamydia psittaci</i>) Atypical pneumonia (<i>Mycoplasma pneumoniae</i>) Meningococcal infection (<i>Neisseria meningitidis</i>) Streptococcal infection, rheumatic fever (<i>Streptococcus pyogenes</i>) Whooping cough (<i>Bordetella pertussis</i>) Diphtheria (<i>Corynebacterium diphtheriae</i>) Pneumonic plague** (<i>Yersinia pestis</i>)</p> <p>Fungal infections Histoplasmosis (<i>Histoplasma capsulatum</i>)</p>	
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****INFECTIVE AGENTS**

The infective agents that cause respiratory infections include viruses, bacteria, rickettsiae and fungi.. The spread of infection from the respiratory tract may lead to the invasion of other organs of the body. Bacterial meningitis is often secondary to a primary focus in the respiratory tract, for

example infections due to *Streptococcus pneumoniae*, *Haemophilus influenzae* or *Mycobacterium tuberculosis*. In the case of meningococcal infection, there are usually no local symptoms from the primary focus of infection in the nasopharynx. These pathogens vary in their ability to survive in the environment. Some are capable of surviving for long periods in dust, especially in a dark, warm, moist environment, protected from the lethal effects of ultraviolet rays of sunshine. For example, *M. tuberculosis* can survive for long periods in dried.

***TRANSMISSION**

There are three main mechanisms for the transmission of air-borne infections – droplets.... droplet nuclei.... and dust.

***HOST**

1-Non-specific defenses a number of non-specific factors protect the respiratory tract of man. These include mechanical factors such as the mucous membrane.

2- Immunity Specific immunity may be acquired by previous spontaneous infection or by artificial immunization.

***CONTROL OF AIR-BORNE INFECTIONS**

The main principles involved in the control of respiratory infections are three headings - infective agent.... the mode of transmission..... and host factors.

VIRAL INFECTIONS

MEASLES an infectious viral disease causing fever and a red rash on the skin, typically occurring in childhood.

The presence of punctate lesions (Koplik's spots) on the buccal mucosa may assist diagnosis in the early prodromal phase. Deaths occur mainly from complications such as secondary bacterial infection, with bronchopneumonia.

The incubation period is usually about 10 days, at which stage the patient presents with the prodromal features of fever and coryza. The skin rash usually appears 3--4 days after the onset of symptoms. The etiological agent is the measles virus.

MUMPS this is an acute viral infection which typically affects salivary glands, especially the parotids, but may also involve the submandibular or the sub lingual salivary glands. Pancreatitis, orchitis, inflammation of the ovaries or meningo-encephalitis occurs. The incubation period varies from 2 to 4 weeks; usually it is about 21 weeks. The infectious agent is mumps virus.

The infection is transmitted by droplets or by contact, directly or indirectly, through fomites.

INFLUENZA

<i>Occurrence:</i>	Worldwide local endemic/epidemic picture; massive pandemics
<i>Organism:</i>	Influenza viruses (A, B, C)
<i>Reservoir:</i>	Humans
<i>Transmission:</i>	Air-borne, contact
<i>Control:</i>	Killed vaccine (identical antigenic strain)

This is an acute respiratory infection that is characterized by systemic manifestations - fever, rigors, headache, malaise and muscle pains, and by local manifestations of coryza, sore throat and cough. Secondary bacterial pneumonia is an important complication. The case fatality rate is low but deaths tend to occur in debilitated persons, those with underlying cardiac, respiratory or renal disease, and in the elderly. The incubation period is usually 1-3 days.

They have been recovered from various types of animals and birds which may well act as important sources of new strains showing major antigenic changes (antigenic shift). Pandemics may originate where there is close

contact between humans and animals. Sporadic cases and limited outbreaks occur annually throughout the world and are the result of progressive, minor antigenic change (antigenic drift). Enzyme immunoassays (EIAs) rapidly diagnose type influenza while PCR can detect influenza virus RNA in clinical specimens.

(BACTERIAL INFECTIONS)

TUBERCULOSIS	
<i>Occurrence:</i>	Worldwide
<i>Organism:</i>	<i>Mycobacterium tuberculosis</i> (human and bovine strains)
<i>Reservoir:</i>	Humans, cattle
<i>Transmission:</i>	Air-borne droplets, droplets nuclei and dust Milk and infected meat
<i>Control:</i>	General improvement in housing Nutrition and personal hygiene Immunization with BCG Chemoprophylaxis Case finding and treatment, DOTS

Tuberculosis remains one of the major health problems in many tropical countries; in some countries the situation is being aggravated by dense overcrowding in urban slums. An estimated 8-10 million people develop overt tuberculosis

The coexistence of HIV infection and tuberculosis has been hailed as one of the most serious threats to human health since.

Primary complex

On first infection, the patient develops the primary complex which consists of a small parenchymal lesion and involvement of the regional lymph node; in the lungs, this constitutes the classical Ghon focus, with a small lung lesion and invasion of the mediastinal lymph node. In most cases the

primary complex heals spontaneously, with fibrosis and calcification of the lesions, but the organisms may persist for many years within this focus.

Secondary infection

Apart from the primary complex and reactivation of an existing lesion or by exogenous re-infection. Destruction of the lung parenchyma, clinically, it may present with cough, haemoptysis and chest pain, with general constitutional symptoms - fever, loss of weight and malaise; often it remains virtually asymptomatic especially in the early stages. The incubation period is from 4 to 6 weeks.

Bacteriology The causative agent is *Mycobacterium tuberculosis*, the tubercle bacillus. The human type produces most of the pulmonary lesions, also some extra pulmonary lesions; the bovine strain of the organism mainly accounts for extrapulmonary lesions. Other types of *M. tuberculosis* (avian and atypical strains) rarely cause disease in humans; Tubercle bacilli survive for long periods in dried sputum and dust.

Laboratory diagnosis The organism may be identified on examination of sputum and other pathological specimens (cerebrospinal fluid, urine, pleural fluid or gastric washings). The tubercle bacillus is Gram-positive,. It is usually demonstrated by the Ziehl-Neelsen method. The organism can be isolated on culture using special media and DNA amplification by PCR is available in and Tuberculin test.

Control

In planning a programme for the control of tuberculosis, the entire population can be conveniently considered as falling into four groups:

- No previous exposure to tubercle bacilli - they would require protection from infection.
- Healed primary infection - they have some immunity but must be protected from reactivation of disease and reinfection.
- Diagnosed active disease - they must have effective treatment and remain under supervision until they have recovered fully.

- Undiagnosed active disease - without treatment the disease may progress with further irreversible damage. As potential sources of infection, they constitute a danger to the community.

The control of tuberculosis can be considered at the following levels of prevention:

- General health promotion;
- Specific protection - active immunization,
- Chemoprophylaxis, control of animal reservoir;
- Early diagnosis and treatment;
- Limitation of disability;
- Rehabilitation;
- Surveillance.

DRUG TREATMENT

WHO recommends the short course directly observed therapy (DOTS). This consists of 2 months of isoniazid, rifampicin, pyrazanimide and ethambutol given daily, followed by 4 months of isoniazid and rifampicin given thrice weekly.

As part of the DOTS strategy, health workers counsel and observe their patients swallowing each dose, and the health service monitors the patients' progress until each is cured. Political and financial commitments and a dependable drug supply are essential parts of the DOTS strategy.

PNEUMONIAS

A variety of organisms may cause acute infection of the lungs. The non-tuberculosis pneumonias are usually classified into three groups:

- **Pneumococcal;**
- **Other bacterial;**
- **Atypical.**

Pneumococcal pneumonia

<i>Occurrence:</i>	Worldwide; epidemics occur in work camps, prisons
<i>Organism:</i>	<i>Streptococcus pneumoniae</i>
<i>Reservoir:</i>	Humans
<i>Transmission:</i>	Droplets, dust, air-borne contact, fomites
<i>Control:</i>	Avoid overcrowding Good ventilation Improve personal hygiene (spitting, coughing) Chemoprophylaxis to control institutional outbreaks Vaccination

Pneumococcal infection of the lungs characteristically produces lobar consolidation but bronchopneumonia may occur in susceptible groups. Typical; ~ the untreated case resolves by crisis, but with ~ biotic treatment there is usually a rapid response. Metastatic lesions may occur in the meninges, brain heart valves, pericardium or joints. Pneumonia and bronchopneumonia are two of the major causes of death in the tropics especially in children. The incubation period is 1-3 days. The disease is usually notifiable.

Prompt treatment of cases with antibiotics penicillin, cephalosporins, and vancomycin would prevent complications. Chemoprophylaxis with penicillin is indicated in cases of outbreaks in institutions.

Other bacterial pneumonias

Occurrence:	Worldwide
Organisms:	<i>Mycoplasma pneumoniae</i> , <i>Staphylococcus aureus</i> , <i>Legionella pneumophila</i> , <i>Chlamydia pneumoniae</i> , <i>Haemophilus influenzae</i>

Mycoplasma pneumonia

This is an acute febrile illness usually starting with signs of an upper respiratory infection, later spreading to the bronchi and lungs. Radiological examination of the lungs shows hazy patchy infiltration. . . . The incubation period is usually about 12 days, ranging from 7 to 21 days. The infective agent is *Mycoplasma pneumonia* (pleuro-pneumonia-like organism).

Occurrence:	Worldwide
Organism:	<i>Mycoplasma pneumoniae</i>
Reservoir:	Humans
Transmission:	Droplets, contact
Control:	General measures for controlling respiratory infection Treatment of patients with tetracycline

LABORATORY DIAGNOSIS

The diagnosis can be established by showing a rising complement fixation titre of antibodies to *M. pneumoniae*. The organism can also be identified by collecting sputum or throat washings at an early stage of the infection, using antigen capture enzyme immunoassay, PCR or detection of ribosomal RNA genes.

DIPHTHERIA

Usually this disease is caused by infection with *Corynebacterium diphtheria* (Klebs-Loeffler bacillus). There may be acute infection of the mucous membranes of the tonsils, pharynx, larynx or nose; skin infections may also occur and are of particular importance in tropical countries. Much faucal swelling may be produced by the local inflammatory reaction and the membranous exudates in the larynx may cause respiratory obstruction. The exotoxin which is produced by the organism may cause nerve palsies or myocarditis. The incubation period is 2-5 days. Diphtheria is included in the list of diseases that are notifiable nationally.

C. diphtheria is a Gram-positive rod, with a characteristic bipolar metachromatic staining. Virulent strains produce a soluble exotoxin which is responsible for the systemic manifestations and the sequelae of the disease. Three major types, *gravis*, *intermedius* and *mitis*, have been differentiated.

TRANSMISSION the infective agents may be discharged from the nose and throat or from skin lesions. The transmission of the infection may be by:

- Air-borne infection.
- Direct contact.
- Indirect contact through fomites.
- Ingestion of contaminated raw milk.

Antitoxin should be given promptly on making the clinical diagnosis and without awaiting laboratory confirmation. Treatment with penicillin or other

antibiotics may be given in addition. The patient should be isolate; until throat cultures cease to yield toxigenic strains.

Active immunization with diphtheria toxoid has proved a reliable measure for the control of this infection. It is usually administered in combination with pertussis vaccine and tetanus toxoid (DPT or triple antigen) from the age of 2 to 3 months. A booster dose of diphtheria toxoid is recommended at school entry and this may be given in combination with typhoid vaccine.