



WHO / SEARO T. Pietrasik

# ePROTECT

## Pre-deployment training for Acute Respiratory Infections

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Acute Respiratory Infections of public  
health concern : An introduction



# Learning objectives

## **By the end of the session, you will be able to:**

- Describe basic information about acute respiratory infections (ARIs) and how they are transmitted.
- Summarize the symptoms, treatment, and prevention of ARIs of public health concern.

# Session outline

1. Introduction to acute respiratory infections (ARIs), what they are and how they transmit
2. Examples of acute respiratory infections of potential concern
3. Major Global ARI events

WHAT THEY ARE AND HOW THEY TRANSMIT

# INTRODUCTION TO ACUTE RESPIRATORY INFECTIONS

# What are acute respiratory infections? 1/2

- An acute respiratory infection is a disease of the respiratory tract caused by an infectious agent.
- Symptoms typically arise within hours to days, of exposure to a pathogen (a virus, bacteria, or a combination of both, or another disease-causing agent).
- ARIs can be mild to severe to fatal, depending on the interactions between the pathogen, the host, and the environment. Some infections can even be asymptomatic (subclinical infection).

# What are acute respiratory infections? 2/2

- Typical symptoms include: fever, runny nose, sneeze, cough, lethargy, body ache, sore throat, shortness of breath, wheezing and difficulty breathing in severe cases.
- ARIs are classified into two: 1) Upper respiratory tract infection (URTI): infection of nose and throat, and 2) Lower respiratory tract infection (LRTI): infection of lung (pneumonia, bronchitis). LRTI often require hospitalization and can be severe and life-threatening.

# Who is affected by acute respiratory infections? 1/2

- Acute respiratory infections (ARIs) are very common and widespread disease. Everyone can get ARIs
- Lower respiratory tract infection (LRTI), a severe form of ARI, are the leading cause of illness and death worldwide.
- In Lower Income Countries, LRTI is the No.1 killer of children under 5 years of age.
- LRTI can be serious and life-threatening particularly in the very young, old, pregnant women, people living with chronic medical conditions.



# Who is affected by acute respiratory infections? 2/2

## Elements

## What we need to know about it?

### Pathogen

(infectious agent)

Mode of transmission, transmissibility, virulence

### Host (people)

Age, underlying diseases, nutritional status, occupation, immune status, smoking status, concurrent or past infections with other pathogens

### Environment

Physical environment: Air quality, crowding, temperature and humidity (season), hygiene

Contextual environment: Healthcare access and quality, infection control and prevention measures (isolation, barrier nursing), medical counter measures (vaccine, therapeutics, etc.)



# Interaction of host-pathogen-environment to create illness 1/2

- Host susceptibility, disease transmission and disease severity are all variable for respiratory infections because of the interactions of host, pathogen, and environmental factors.
- Host factors (such as immune system status or the presence of underlying conditions) can affect how susceptible an individual is to getting sick with a pathogen and how severe the disease will be.
- Variations in the pathogen can affect how easily it is transmitted and how severe the disease will be as well.



# Interaction of host-pathogen-environment to create illness 2/2

- Environmental factors (both physical and societal) can also affect the transmission of a pathogen as well as the susceptibility of a host to infection.
- Therefore, while all people may be at risk of infection, the level of risk is dependent on multiple factors. Risk assessment needs to be done in the context of considering the pathogen as well as the other factors that may play a role.



# Why are certain ARIs of concern to public health?

- Easily transmitted from person to person
- Disease is severe (high illness, death and risk of sequelae, complications and long lasting effects)
- Lack of underlying immunity in the population
- No available vaccine or treatment, or resistance to existing treatment
- Unknown or new pathogen
- Size of the outbreak

# EXAMPLES OF ACUTE RESPIRATORY INFECTIONS OF PUBLIC HEALTH CONCERN

# Examples of acute respiratory infections of potential concern

- Influenza viruses causing human infection for which the population has little to no underlying immunity (i.e. non-seasonal influenza viruses)
- Severe Acute Respiratory Syndrome (SARS-CoV)
- Middle Eastern Respiratory Syndrome (MERS-CoV)
- Novel (unknown) pathogens with the potential for a high public health impact
- Other pathogens (Pneumonic plague, Legionella)



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# What are non-seasonal influenza viruses? 1/3

- These include viruses that are circulating in animal populations (called zoonotic influenza viruses), such as:
  - Avian influenza viruses (H5N1, H7N9, H5N6)
  - Swine influenza viruses (H1N1sw, H1N2sw, H3N2sw)
  - Newly emerged influenza viruses from genetic mutation/exchange (potential pandemic virus)

# What are non-seasonal influenza viruses? 2/3

- Human cases are considered rare, and they are most often acquired through direct or indirect contact with infected animals or contaminated environment.
  - There has not been any sustained transmission of these viruses among humans. Human cases with known zoonotic influenza viruses have been reported from approximately 20 countries around the world.



# What are non-seasonal influenza viruses? 3/3

- Human infections can be asymptomatic or can cause a range of symptoms from conjunctivitis (pink eye) to fever and cough to shortness of breath.
  - Pneumonia (an infection in the lungs) may occur and may require hospitalization and intensive medical treatment. Some deaths have been reported. Gastrointestinal symptoms (vomiting, diarrhoea, and abdominal pain) have been reported in some patients.

# How can infection with non-seasonal influenza viruses be treated?

- There is evidence that some antiviral drugs can be useful in treating humans infected with these known non-seasonal influenza viruses.
- Antiviral drugs should be administered when the infection is suspected without waiting for diagnosis, ideally but not limited to, within 48 hours of symptom onset to maximize their benefit.
- Other treatments are supportive and based on the patient's clinical condition (e.g. mechanical ventilation in the case of respiratory system failure).

# How can infection with non-seasonal influenza viruses be prevented? 1/2

- Detect and control the virus infection in animal population ('One Health' approach)
- Avoid direct and indirect (environmental) contact with affected animals in areas where avian/swine influenza viruses are known to be circulating.
- Avoid the consumption of raw or undercooked animal products. Always cook food thoroughly.

# How can infection with non-seasonal influenza viruses be prevented? 2/2

- Special precautions are to be taken in healthcare settings to prevent the spread of the virus among patients and between patients and healthcare providers.
- Practice good hygiene, especially regular hand washing, before and after touching animals at farms, markets, or other places where animals may be present.

# Non-seasonal influenza viruses

For more information:

- Types of influenza virus infections in humans:
  - [http://www.who.int/influenza/human\\_animal\\_interface/virology\\_laboratories\\_and\\_vaccines/influenza\\_virus\\_infections\\_humans\\_feb14.pdf?ua=1](http://www.who.int/influenza/human_animal_interface/virology_laboratories_and_vaccines/influenza_virus_infections_humans_feb14.pdf?ua=1)
- Influenza at the human-animal interface:
  - [http://www.who.int/influenza/human\\_animal\\_interface/en/](http://www.who.int/influenza/human_animal_interface/en/)
- A(H5N1)
  - [http://www.who.int/influenza/human\\_animal\\_interface/avian\\_influenza/h5n1\\_research/faqs/en/](http://www.who.int/influenza/human_animal_interface/avian_influenza/h5n1_research/faqs/en/)
- A(H7N9)
  - [http://www.who.int/influenza/human\\_animal\\_interface/influenza\\_h7n9/en/](http://www.who.int/influenza/human_animal_interface/influenza_h7n9/en/)
- Swine influenza in humans:
  - [http://www.who.int/influenza/human\\_animal\\_interface/swine\\_influenza/en/](http://www.who.int/influenza/human_animal_interface/swine_influenza/en/)
- Food safety and influenza
  - [http://www.who.int/foodsafety/areas\\_work/zoonose/avian/en/](http://www.who.int/foodsafety/areas_work/zoonose/avian/en/)

# Middle Eastern Respiratory Syndrome (MERS)

## – Overview 1/2

- MERS is an acute respiratory infection caused by a coronavirus (MERS-CoV).
- First reported in a severe pneumonia patient in Kingdom of Saudi Arabia in 2012.
- As of Jan 2020, it has caused over 2500 human infections and over 800 deaths. Most human cases have been reported in the countries of the Arabian Peninsula.
- Cases and outbreaks have been reported by countries outside the Middle East, but these are usually related to infections initially acquired in the Middle East.

# Middle Eastern Respiratory Syndrome (MERS)

## – Overview 2/2

- Human-to-human transmission in healthcare settings accounts for the majority of MERS cases worldwide. MERS-CoV has not yet caused widespread outbreaks outside of healthcare settings (sustained community transmission).
- There was a large outbreak associated with hospitals in the Republic of Korea in May-June 2015, following a human case who had travelled to the Middle East.
- MERS-CoV is widely circulating among dromedary camels and thought to be transmitted to human via direct or indirect contact with camels or camel-related products (e.g. raw camel milk).



# MERS – Facts 1/2

- **Mode of transmission:** Infected persons can transmit the virus to other persons in close contact. This has most often occurred in healthcare settings among patients and between patients and their caregivers.
- **Incubation period:** 5 days on average (with a range from 2-14 days).
- **Susceptible groups:** healthcare workers, and people caring for cases, are at risk of infection because of their close contact with patients. Severe illness seems to occur more frequently in older people, people with compromised immune systems, and people with underlying medical conditions (heart disease, kidney disease, chronic lung disease, diabetes, cancer).

# MERS – Facts 2/2

- **Symptoms:** Human infections can be asymptomatic or can cause a range of symptoms from a fever and cough to shortness of breath. Pneumonia (an infection in the lungs) may occur and may require hospitalization and intensive medical treatment. Severe illness has resulted in death in about one-third of the cases.
- In some cases, infected patients have also reported gastrointestinal illness (diarrhoea).
- There is currently no specific treatment for MERS-CoV infection in humans. Treatment is supportive and based on the patient's clinical condition (e.g. mechanical ventilation in the case of respiratory system failure).

# How can infection with MERS-CoV be prevented? 1/2

- Avoid unprotected contact with dromedary camels. Persons with underlying medical conditions as described previously should avoid contact with camels.
- Avoid the consumption of raw or undercooked animal products, including milk, meat and urine.
- Practice good hygiene, especially regular hand washing, before and after touching animals at farms, markets, or other places where camels may be present.

# How can infection with MERS-CoV be prevented? 2/2

- Special precautions are to be taken in healthcare settings to prevent the spread of the virus among patients and between patients and healthcare providers.
- For more information:
  - MERS:
    - <http://www.who.int/emergencies/mers-cov/en>
    - Introductory Course on MERS:  
<https://openwho.org/courses/MERS-en>

# MAJOR GLOBAL ARI EVENTS

# Major global ARI events

- Influenza pandemics (1918, 1957, 1968, 2009)
- 1997: avian influenza A (H5N1) in humans (HK SAR)
- 2002: SARS-CoV emerged in China
- 2003: avian influenza A (H5N1) spread in Eurasia and Africa caused human infections in 15 countries.
- 2012: MERS-CoV was detected in Saudi Arabia
- 2013: avian influenza A(H7N9) emerged in humans in China
- 2019: COVID-19 emerged in China