

Emerging Infectious Diseases

(Respiratory)

Objectives:

- Define and understand emerging and re-emerging diseases
- Understand the viral antigenic variations of influenza virus
- List the different hosts for influenza (according to influenza type), MERS-Cov and SARS-Cov
- Be familiar with the famous pandemics for each of these viral infections, and measures used to contain spread
- Provide appropriate prevention and control measures for each of these viral infections

Reference:

Dr. Hafsa Raheel's slides & notes

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Emerging infectious diseases

Definitions

- **Emerging infectious diseases:** something new e.g: corona, ebola virus
- Diseases that are recognized in the human host for the first time

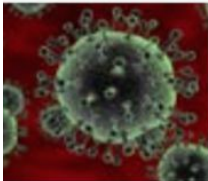
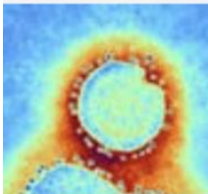
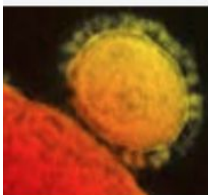
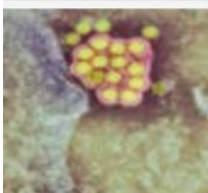
- **Re-emerging diseases:** reappearing e.g: TB
- Diseases that historically have infected humans, but continue to appear in new locations or in drug-resistant forms, or that reappear after apparent control or elimination

(the doctor discussed these tables in details)

Table 1. Some major factors that underlie disease emergence and reemergence [2,5].

<u>The Microbial Agent</u>	<u>The Human Host</u>	<u>The Human Environment</u>
Genetic adaptation and change	Human susceptibility to infection	Climate and weather
Polymicrobial diseases	Human demographics and behavior	Changing ecosystems
	International trade and travel	Economic development and land use
	Intent to harm (bioterrorism)	Technology and industry
	Occupational exposures	Poverty and social inequality
	Inappropriate use of antibiotics	Lack of public health services
		Animal populations
		War and famine
		Lack of political will

Important zoonotic emerging infectious diseases reported to WHO, January to November 2013

	Emerging infection	Countries	Summary of cases	Control measures
	Avian influenza A/H5N1	Cambodia, Egypt, China, Indonesia, Bangladesh, Vietnam	20 cases including 11 deaths reported in Cambodia. Sporadic reports of cases (11 in total) from other countries	Rapid response teams deployed Enhanced surveillance measures Public health education campaigns
	Avian influenza A/H7N9	China	139 laboratory confirmed cases with 45 deaths (March-November 2013). Linked to live bird markets with no sustained human to human transmission	Temporary closure of live bird markets in some affected areas Culling of live birds in wholesale markets in some affected areas
	Middle East respiratory syndrome corona virus	Saudi Arabia, Oman, France, Italy, Jordan, Qatar, Tunisia, United Arab Emirates, UK	150 laboratory confirmed cases and 64 deaths (September 2012-November 2013). Most case occurred in Saudi Arabia with cases in other countries in single figures. Limited human to human spread	Increase surveillance of sudden acute respiratory illness across WHO member states Elderly and chronically ill people asked to limit visit to the Hajj this year
	Yellow fever	Chad, Ethiopia, Cameroon, Democratic Republic of Congo	Small numbers of laboratory confirmed cases have been notified across several African countries	Increased surveillance activity and mass vaccination campaigns carried out in affected countries

Why are they matter of concern?

- Heavy global burden, mainly when they become epidemics or pandemics.
- They generally have a high mortality rate and spread across countries very rapidly causing panic and fear.
- It is estimated that more than 15 million people all over the planet lose their life's directly because of infectious disease, and millions more due to the complications of chronic ones

Key messages

- Most emerging infectious diseases occur where animals meet humans
- The world's increased demand for meat has been one cause of disrupted ecosystems and increased the potential for emerging infections
- Since 2005 there has been a change of emphasis from control to prevention or minimisation at the source, but more must be done to show its cost effectiveness
- One Health brings together researchers and workers from health, agriculture, environment, and commerce to tackle the problem from all angles It is hoped that this approach will improve human health and reduce economic costs by preventing emerging infections at their source

What is Middle East respiratory syndrome coronavirus (MERS-CoV)?

- Middle East respiratory syndrome (MERS) is a viral respiratory disease caused by a novel coronavirus (Middle East respiratory syndrome coronavirus, or MERS-CoV) that was first identified in Saudi Arabia in 2012
- Coronaviruses are a large family of viruses that can cause diseases ranging from the common cold to Severe Acute Respiratory Syndrome (SARS).
- Approximately 35% of reported patients with MERS have died **high mortality**
- Human-to-human infections in health care settings, dromedary camels are a major reservoir host for MERS-CoV and an animal source of MERS infection in humans.
- The virus does not seem to pass easily from person to person unless there is close contact, such as occurs when providing unprotected care to a patient.
- Health care associated outbreaks have occurred in several countries, with the largest outbreaks seen in Saudi Arabia, United Arab Emirates, and the Republic of Korea.

History of origin; cases and clusters:

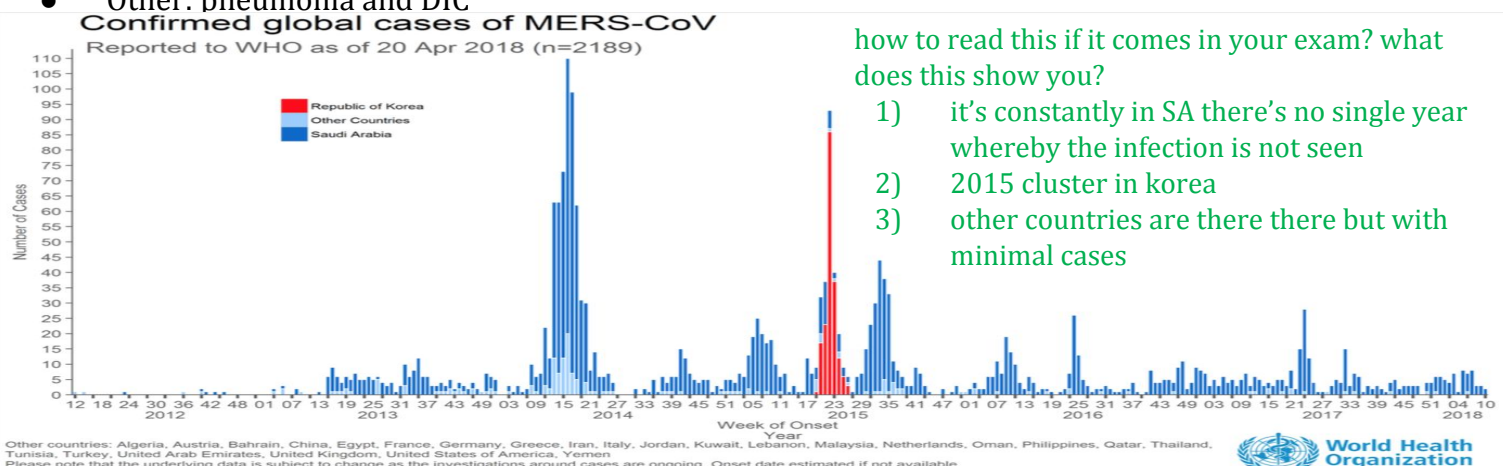
First identified in Saudi Arabia in June: Jeddah, hospitalized with pneumonia, ARDS, acute kidney injury.....Died. MERS-CoV was isolated from his sputum.

The maximum cases found in SA .

- September 2012: Qatar A patient with acute kidney injury, ARDS I.
- He had recently traveled to Saudi Arabia.

April 2012: Jordan

- 11 pneumonia cases (8 HCWs) **health care workers**
- One patient: pneumonia and pericarditis
- Other: pneumonia and DIC



Who are risk?

- **comorbidities (cancer, DM, obesity..etc)**
- Populations in close contact with dromedaries (e.g. farmers, abattoir workers, shepherds, dromedary owners)
- health care workers caring for MERS-CoV patients
- Healthy adults infected with MERS-CoV tend to have mild subclinical or asymptomatic infections.
- To date, limited human-to-human transmission has occurred between close contacts of confirmed cases in household settings.
- The case clusters in the UK, Tunisia, Italy, and in HCWs in Saudi Arabia and France strongly suggest that human to human transmission occurs.
- MERS-CoV does not yet have pandemic potential.

Recommendation: Who are risk?

- Anyone visiting farms, markets, barns, or other places where dromedary camels and other animals are present should practice general hygiene measures, including regular hand washing before and after touching animals, and should avoid contact with sick animals.
- Consumption of raw or undercooked animal products, including milk and meat, carries a high risk of infection from a variety of organisms that might cause disease in humans.
- Animal products that are processed appropriately through cooking or pasteurization are safe for consumption, but should also be handled with care to avoid cross contamination with uncooked foods.
- Camel meat and camel milk are nutritious products that can continue to be consumed after pasteurization, cooking, or other heat treatments.

Case definitions: how do we diagnose a case

- Limited data
- Fever, chills/rigors, headache, non-productive cough, dyspnea, and myalgia.
- Sore throat, coryza, sputum production, dizziness, nausea, and vomiting, diarrhea, and abdominal pain.

there is no particular symptoms, so how to support the Dx? by history. occupation wise, living wise.

Who needs to be monitored? (Patient Under Investigation):

- A. Fever AND pneumonia or ARDS AND EITHER:
- HX. of travel within 14d
- Close contact with a symptomatic traveler within 14d
- A member of a cluster of patients with severe acute respiratory illness? MERS

Case definitions:

- **Confirmed case:**
- Laboratory confirmation
- **Probable case:** a PUI with absent or inconclusive laboratory results for MERS-CoV infection who is a close contact of a laboratory-confirmed MERS-CoV case.

Close contact...definition:

- Includes anyone who provided care for the patient, including a HCWs or family member or another individual who had other similarly close physical contact, and anyone who lived with or visited a case while the case was symptomatic. **we need to have them screened as well**

Clinical manifestations:

- Incubation period:
- 5.2 days in S.Arabia **very short**
- 9-12 days: France
- 2-14 d
- WHO, CDC: MERS-CoV be considered in individuals with a syndrome of MERS who returned from travel to the Arabian countries within the past **14 days**.

Laboratory findings:

- Leukopenia
- Lymphopenia
- Thrombocytopenia
- Virus isolation **should be done** from lower respiratory tract urine, feces, serum.
- Nasopharyngeal and oropharyngeal swab specimen

Whom to test?

not all health care workers because of the cost and it's not a disease which infects healthy people who are not in touch with infected people or camels, we shouldn't be going and asking them for screening test

- A person with an acute respiratory infection, which may include history of fever and cough and evidence of **pulmonary parenchymal disease(pneumonia, ARDS)** based upon clinical or radiographic evidence of consolidation, who requires admission to hospital.
- The disease is in **a cluster** that occurs within a 14-day period, without regard to place of residence or history of travel.
- Cluster: workplace, household,...
- HCW who has been working in an environment where patients with severe acute respiratory infections are being cared.
- HX. Of travel to the Middle East within 14 days before onset of illness.
- Person with acute respiratory illness of any severity who, within 14 days before onset of illness, was in close physical contact with a confirmed or probable case of MERS-CoV infection while that patient was ill.

Treatment:

- **No vaccine or specific treatment is currently available.**
- Treatment is **supportive** and based on the patient's clinical condition.
- No antiviral agents are recommended for the treatment of MERS-CoV infection.

Prevention:

- **There is no licensed vaccine for MERS-CoV.**
- Infection control: standard, contact, and airborne precautions for the management of hospitalized patients.

Influenzas

General information :

Definition:

- Seasonal influenza is an acute respiratory infection caused by influenza viruses which circulate in all parts of the world.
- 4 types :A, B, C and D.
Influenza A and B viruses circulate and cause seasonal epidemics of disease

Subtypes:

- **Influenza A viruses**(Type A Influenza Can not be Eradicated)
A(H1N1)..... A(H1N1)pdm09.....pandemic in 2009
A(H3N2) influenza viruses.
Only influenza type A viruses are known to have caused pandemics.
- **Influenza B viruses** are not classified into subtypes, but can be broken down into lineages. Currently circulating influenza type B viruses belong to either B/Yamagata or B/Victoria lineage.
- **Influenza C virus** is detected less frequently and usually causes mild infections, thus does not present public health importance.
- **Influenza D viruses** primarily affect cattle and are not known to infect or cause illness in people.

Epidemiology :

- All age groups can be affected
- Pregnant women
- Children under 59 months
- Elderly,
- Individuals with chronic medical conditions (such as chronic cardiac, pulmonary, renal, metabolic, neurodevelopmental, liver or hematologic diseases)
- HIV/AIDS, receiving chemotherapy or steroids, or malignancy
- Health care workers are at high risk acquiring influenza virus infection due to increased exposure to the patients and risk further spread particularly to vulnerable individuals.

Transmission :

- Crowded areas including schools and nursing homes.
- When an infected person coughs or sneezes, droplets containing viruses (infectious droplets) are dispersed into the air and can spread up to one meter, and infect persons in close proximity who breathe these droplets in.
- The virus can also be spread by hands contaminated with influenza viruses.
- To prevent transmission, people should cover their mouth and nose with a tissue when coughing, and wash their hands regularly.
- **Seasonal epidemics** occur mainly during winter, while in tropical regions, • influenza may occur throughout the year, causing outbreaks more irregularly.
- **Incubation period** 2 days, but ranges 1- 4 days.

Avian Influenza

- Avian influenza is an infectious disease of birds caused by type A strains of the influenza virus.
- These viruses occur naturally among wild aquatic birds worldwide and can infect domestic poultry and other bird and animal species. The disease,
- Fifteen subtypes of influenza virus are known to infect birds, thus providing an extensive reservoir of influenza viruses potentially circulating in bird populations.
- H5N1; the strain of avian flu known as has been behind outbreaks of deadly avian flu.
- Avian influenza transmitted by birds usually through feces or saliva.
- Avian influenza is not usually passed on to humans, although it has been contracted by people who have handled infected birds or touched surfaces contaminated by the birds.
- Migratory water birds, especially wild ducks. They may do not show clinical disease. The virus colonizes the intestinal tract and is spread in . . They act as a reservoir for the infection of other species the feces
- Pigs can be infected by bird influenza (as well as by the form of § influenza that affects humans) and can pass on the flu to humans.

Swine Flu

- Swine influenza (swine flu) is a respiratory disease of pigs caused by type A influenza virus that regularly cause outbreaks of influenza in pigs.
- Like human influenza viruses, there are different subtypes and strains § of swine influenza viruses. The main swine influenza viruses circulating in U.S. pigs in recent years are: H1N1 influenza virus, H3N2 virus, H1N2 virus.
- Influenza in swine was first recognized as an epizootic disease in 1918.
- Swine influenza virus was first isolated from humans in 1974. Serologic evidence of infections with a swine influenza virus in humans has also been obtained. Viruses of swine may be a potential source of epidemic disease for humans.

Symptoms and Signs

- Systemic: fever
- Nasopharynx: Runny nose; sore throat
- Respiratory: Coughing
- Gastric: Nausea; Vomiting
- Intestinal: Diarrhea
- Psychological: Lethargy; Lack of appetite

Seasonal flu/ Pandemic flu

- **Epidemic (seasonal) influenza** which occurs annually and is § attributable to minor changes in genes that encode proteins on the surface of circulating influenza viruses. These are known as interpandemic epidemics.
- **Pandemic influenza** which occurs when more significant changes in § the influenza A virus arises when human virus strains acquire genes from influenza viruses of other animal species. When this happens, everyone in the world is susceptible to the new virus, and a worldwide epidemic or pandemic can result.

Infection Control

1-Clean

2-cover

3-Contact

Vaccination :

1-Flu shot (Inactivated vaccine Killed virus)

2-Nasal spray flu vaccine (Live attenuated virus vaccine (LAIV))

Treatment

Treatment with oseltamivir or zanamivir is recommended for all people with suspected or confirmed influenza who require hospitalization.



THE END

