

Emerging infectious diseases (Respiratory) I

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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

Definitions

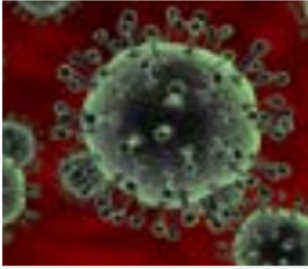
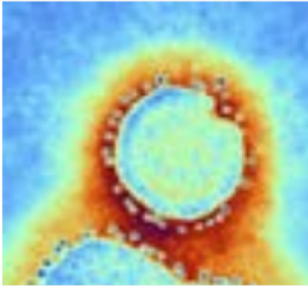
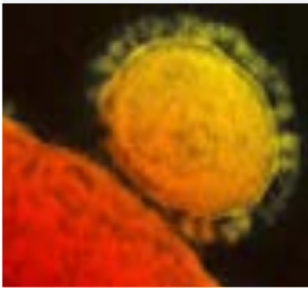
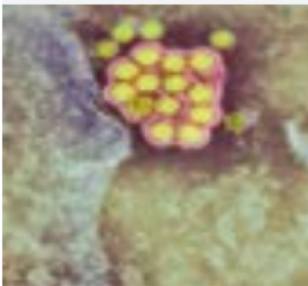
- **Emerging infectious diseases:**
 - Diseases that are recognized in the human host for the first time
- **Re-emerging diseases:**
 - Diseases that historically have infected humans, but continue to appear in new locations or in drug-resistant forms, or that reappear after apparent control or elimination

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

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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)?

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- **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**
- **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 2012** : Jeddah, hospitalized with pneumonia, ARDS, acute kidney injury.....Died. MERS-CoV was isolated from his sputum.

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

April 2012: Jordan

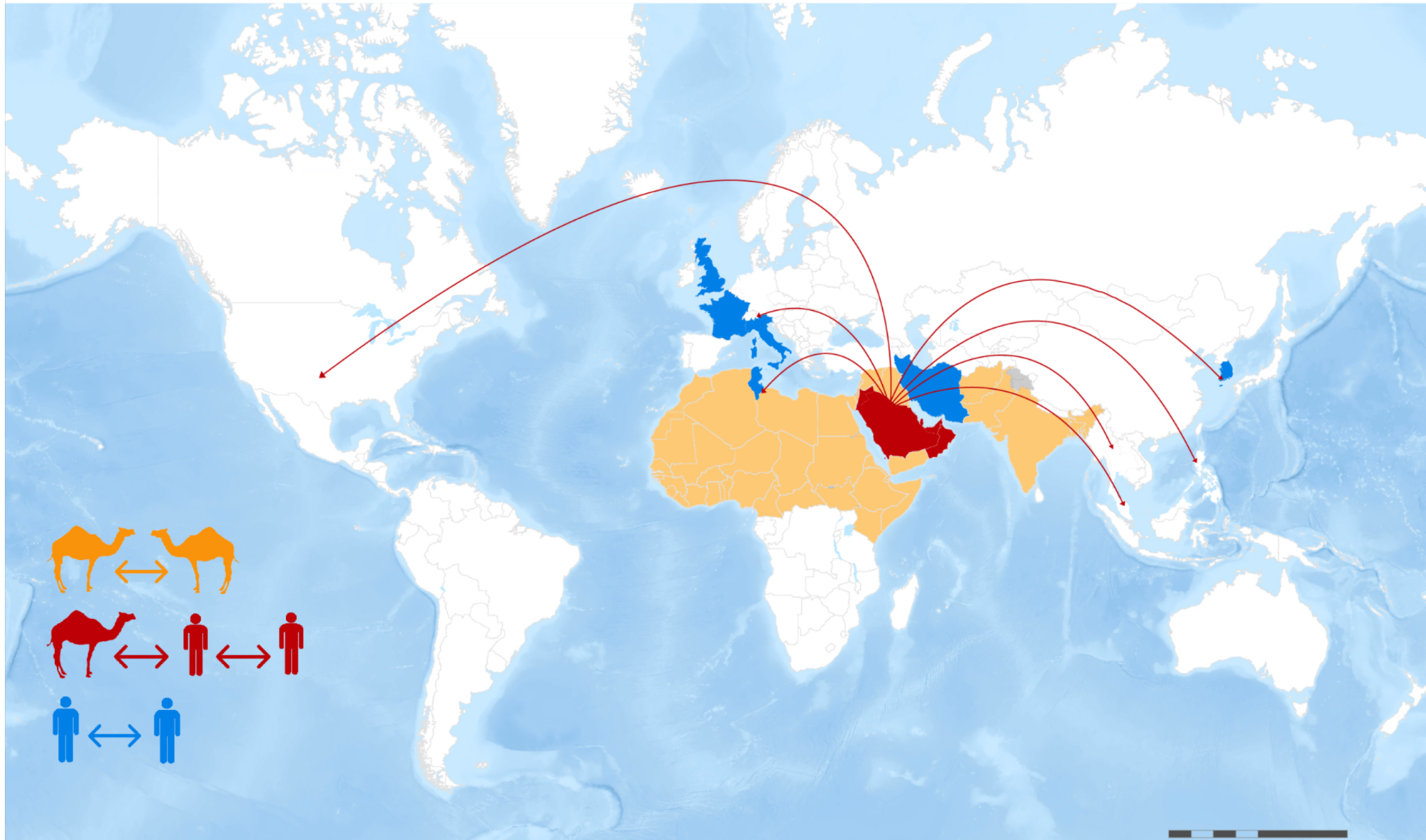
- 11 pneumonia cases(8 HCWs)
- One patient: pneumonia and pericarditis
- Other: pneumonia and DIC

MERS-COV TRANSMISSION AND GEOGRAPHIC RANGE



World Health Organization

MAP DATE: 19 January 2018



Data Source: World Health Organization
Map Production: WHO Health Emergencies Programme

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

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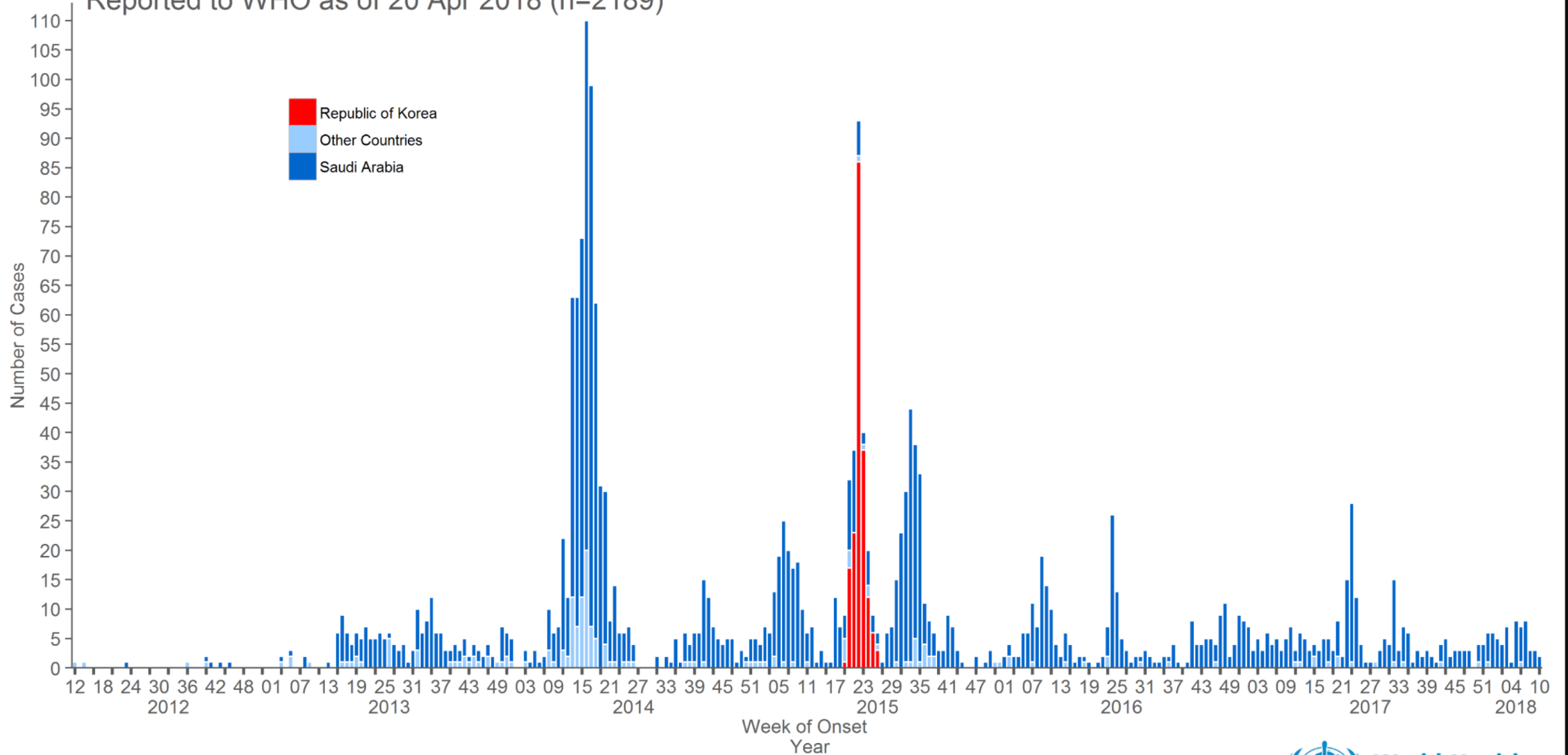
Table 1. Number of laboratory-confirmed MERS cases reported by countries, by year, since 2012*

Country reporting	Number of laboratory-confirmed MERS-CoV cases reported
Algeria	2
Austria	2
Bahrain	1
China	1
Egypt	1
France	2
Germany	3
Greece	1
Iran	6
Italy	1
Jordan	28
Kuwait	4
Lebanon	2
Malaysia	2
Netherlands	2
Oman	11
Philippines	2
Qatar	19
Republic of Korea	185
Saudi Arabia	1,854
Thailand	3
Tunisia	3
Turkey	1
United Kingdom	4
United Arab Emirates	86
United States of America	2
Yemen	1
Total	2,229

* Data as of 30 June 2018

Confirmed global cases of MERS-CoV

Reported to WHO as of 20 Apr 2018 (n=2189)



Other countries: Algeria, Austria, Bahrain, China, Egypt, France, Germany, Greece, Iran, Italy, Jordan, Kuwait, Lebanon, Malaysia, Netherlands, Oman, Philippines, Qatar, Thailand, Tunisia, Turkey, United Arab Emirates, United Kingdom, United States of America, Yemen

Please note that the underlying data is subject to change as the investigations around cases are ongoing. Onset date estimated if not available.



Who are risk?

- 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 Saudia 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:

- 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.

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.

Clinical manifestations:

- Incubation period:
- 5.2 days in S.Arabia
- 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**.

Clinical features:

- Severely ill with **pneumonia and ARDS**, acute kidney injury.
- Many patients required mechanical ventilation.
- **Gastrointestinal symptoms**(anorexia, nausea, vomiting, abdominal pain, diarrhea).
- **Comorbidities**
- Study: in 47 patients with MERS 96 % had underlying comorbidities(DM, Hypertension, chronic cardiac disease, chronic kidney disease, prednisolone)
- Old age

Laboratory findings:

- Leukopenia
- Lymphopenia
- Thrombocytopenia
- Virus isolation from lower respiratory tract urine, feces, serum
- Nasopharyngeal and oropharyngeal swab specimen

Whom to 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.