Common endemic infections in the Middle East

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Objectives:

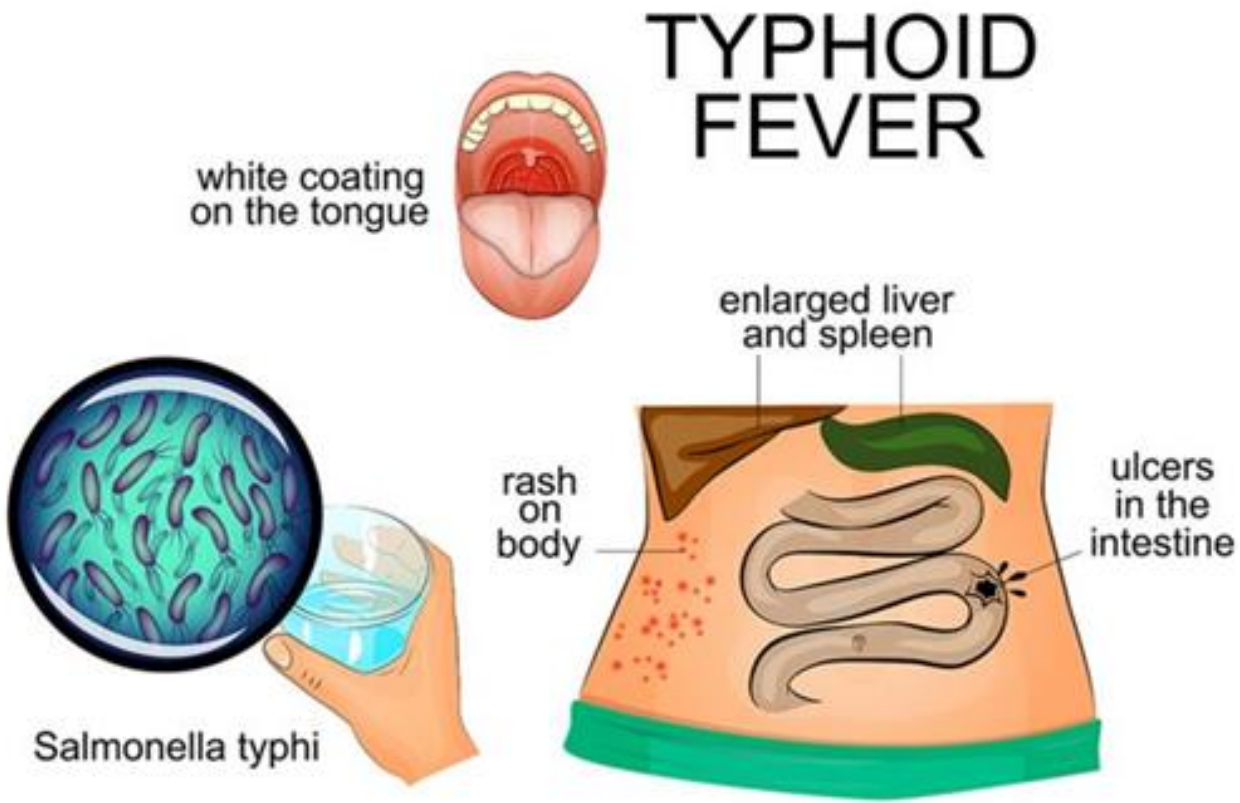
By the end of the lecture the student should be able to:

1. Common terminology describing Endemicity.
2. Common Endemic disease in KSA: especially typhoid, Brucella.
3. Viral hemorrhagic fever (Dengue, RVF, KHV).
4. Leishmaniasis, MERS-COV,covid-19 Malaria
5. For each endemic diseases: Epidemiology, Pathogenesis, Clinical features, Complications, Diagnostic workup, Differential diagnosis, Treatment & prevention

Some Definitions

- **Sporadic** is a disease that occurs infrequently and irregularly.
- **Endemic** refers to the constant presence and/or usual prevalence of a disease or infectious agent in a population within a geographic area.
- **Hyper endemic** refers to persistent, high levels of disease occurrence.
- **Epidemic** refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area.
- **Outbreak** carries the same definition of epidemic, but is often used for a more limited geographic area.
- **Pandemic** refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people.

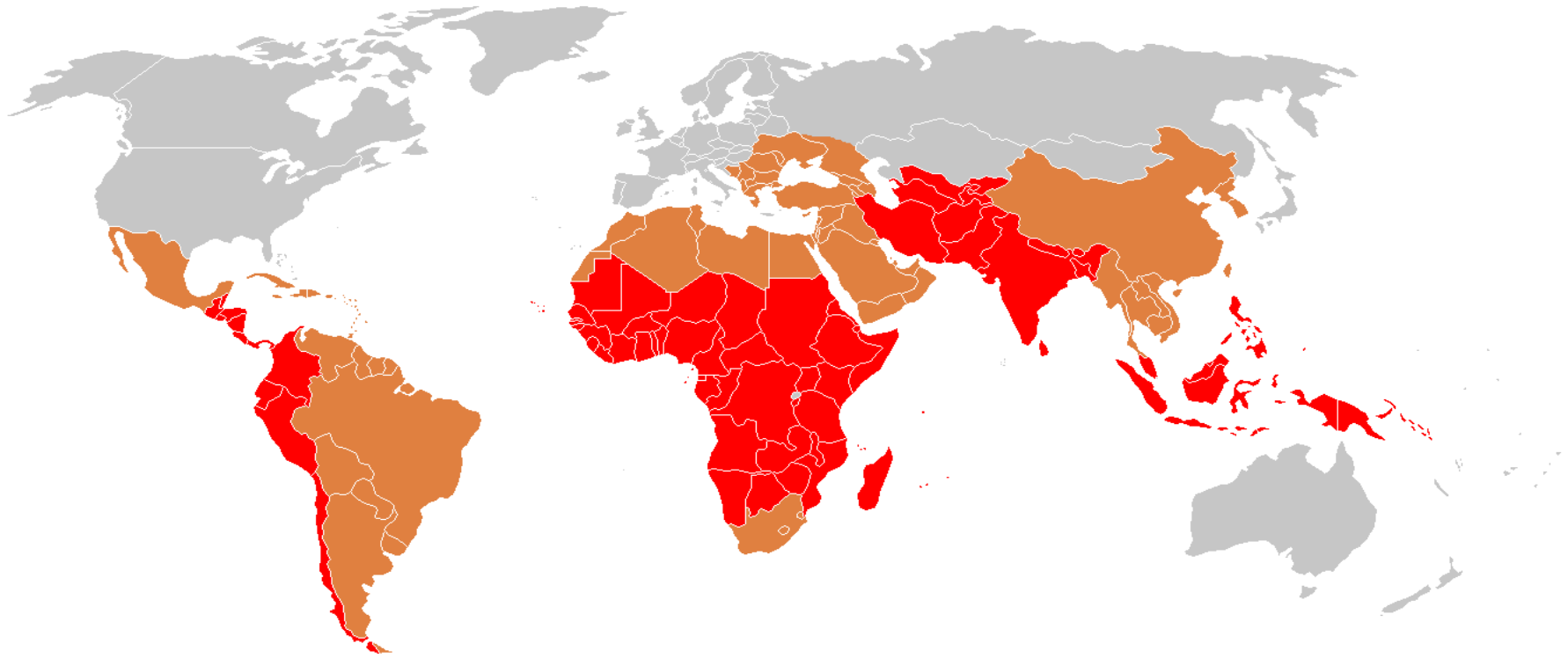
Typhoid fever



Typhoid fever

- It is an acute febrile disease, caused by ***Salmonella typhi*** and S. paratyphi A, B,C
- *S. typhi* and *paratyphi* lives only in humans.
- Persons with typhoid fever carry the bacteria in their bloodstream and intestinal tract.
- Carriers recovering from typhoid fever shed *S.* Typhi in their feces.
- It is transmitted through the ingestion of food or drink contaminated by infected people.

Epidemiology



- strongly endemic
- endemic
- sporadic cases

Pathogenesis of Enteric fever

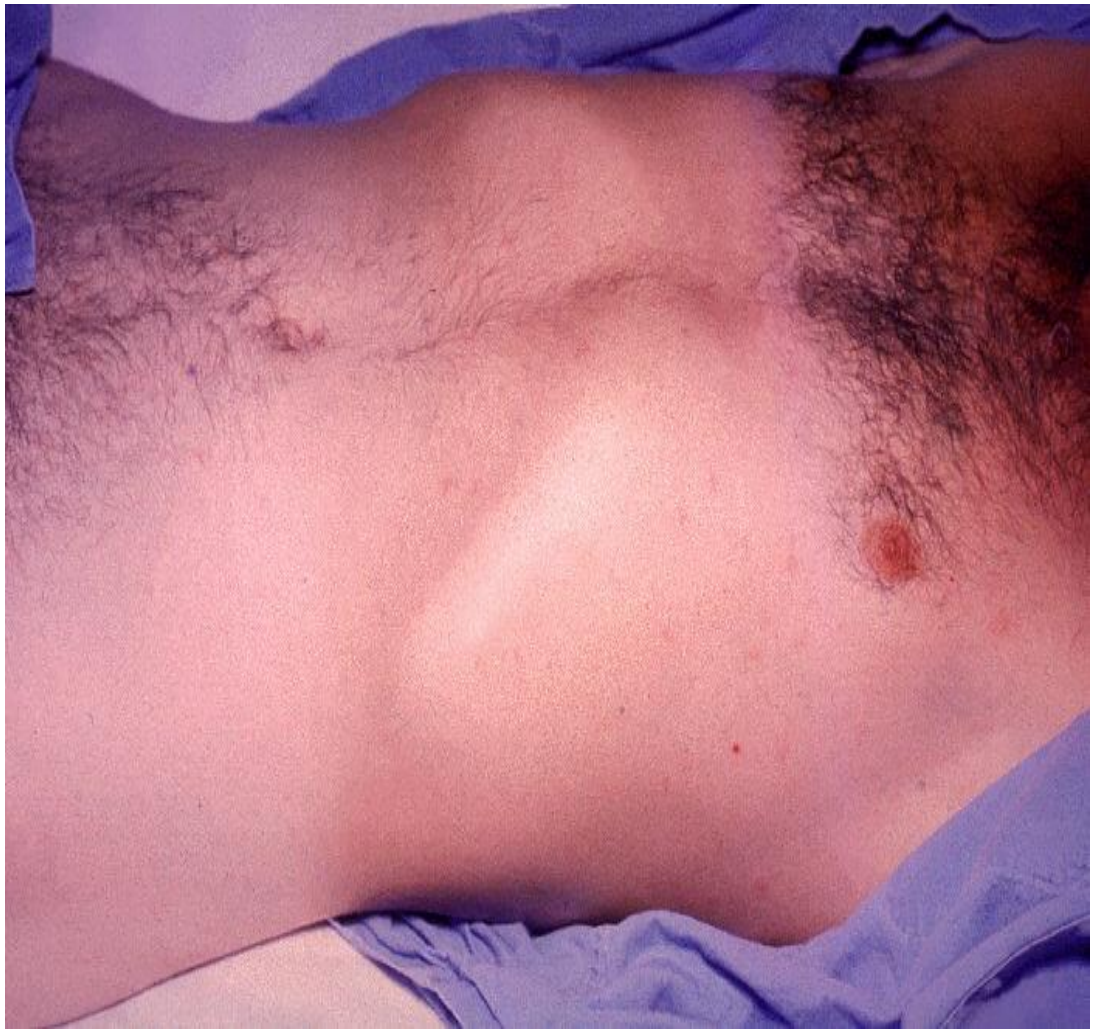
- The organisms penetrate ileal mucosa
- Reach mesenteric lymph nodes - multiply there.
- Invade Blood stream
- Infect Liver, Gall Bladder,, spleen, Kidney, Bone marrow.
- After 7-10 days bacilli pass into blood stream (secondary bacteremia)

Clinical features

- In the first week of illness, rising ("stepwise") fever and bacteremia develop .
- While chills are typical, frank rigors are rare .
- Relative bradycardia or pulse-temperature dissociation may be observed.
- In the second week of illness, abdominal pain develops and "rose spots" (faint salmon-colored macules on the trunk and abdomen) may be seen .
- During the third week of illness, hepatosplenomegaly, intestinal bleeding, and perforation due to ileocecal lymphatic hyperplasia of the Peyer's patches may occur, together with secondary bacteremia and peritonitis. Septic shock or an altered level of consciousness may develop;

Rash in Typhoid

- Rose spots: 2 -4 mm in diameter raised discrete irregular blanching pink maculae's found in front of chest
- Appear in crops of up to a dozen at a time
- Fade after 3 – 4 days



Complications

- Pneumonia, meningitis, osteomyelitis
- Severe intestinal hemorrhage and intestinal perforation
- If not treated can be fatal.

Carriers

- 5% of the survivors continue to excrete the organism for months = carriers.
- In carriers the bacteria remain in the gall bladder and are shed into the intestine.

Investigations

- WBC
- ESR
- Blood, bone marrow, or stool cultures
- Widal test (serum agglutination test). It has cross reactions– false positives. Also false negatives. Not a good test.

Blood Cultures in Typhoid Fevers

- Bacteremia occurs early in the disease
- Blood Cultures are positive in

1st week in 90%

2nd week in 75%

3rd week in 60%

4th week and later in 25%

Differential Diagnosis

- Brucellosis
- Tuberculosis
- Infective endocarditis
- Lymphoma
- Adult Still's disease
- Malaria

Treatment

- 3rd generation cephalosporins, like Ceftriaxone are effective
- ESBL in Pakistan

- Fever may continue for several days after starting therapy.

- The majority are cured with antibiotics.

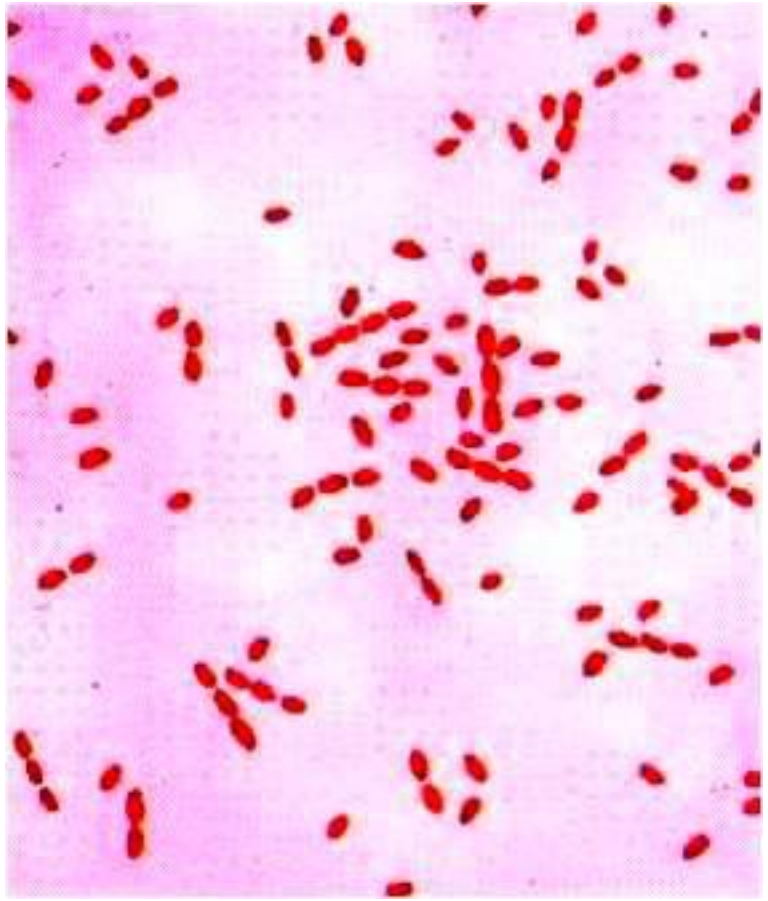
- 10% may relapse.

Prevention and Control (WHO,2009)

Control measures:

- Health education
- Antibiotic treatment
- Excluding disease carriers from food handling.
- A vaccine is available recommended for travelers to high risk areas. It does not provide full protection.

Brucellosis



Brucellosis

- Systemic febrile illness
- Zoonosis.
- B. melitensis and B. abortus are the most frequent.
- The incubation period is 1 – 4 weeks.

Transmission

Infection transmitted to humans by:

→ contact with fluids or meat from infected animals (sheep, cattle, goats, camels)

→eating food products such as unpasteurized milk and cheese(can stay viable for 90 days)

Partially cocked liver!!!!

→need biosafety level 4 for culture (bioterrorism)

Pathogenesis

- Enters the body
- To lymph nodes
- To blood stream
- Reticulo-endothelial System
- Blood
- Any organ

Clinical Manifestations

- Symptoms :

  Fever, Night sweats, Fatigue
  Anorexia, Weight loss
  Arthralgia ,Low back pain
  Depression

- Signs:

  Arthritis
  Lymphadenopathy
  Hepatosplenomegaly

Localized Brucellosis

- Osteoarticular disease: especially sacroiliitis, vertebral spondylitis and large joints arthritis
- Genitourinary disease, especially epididymo-orchitis
- Neurobrucellosis, usually presenting as meningitis, radiculopathy.
- Abscess involving the liver, spleen, abdomen.

DDX

- Typhoid fever
- Tuberculosis
- Infective endocarditis
- Collagen vascular disease
- lymphoma

Investigations

- WBC
- ESR , CRP
- Blood cultures

  slow growth = 2 weeks
- Serology: SAT positive in recent infection

  cut off limit 1:640 or 1:320 with symptoms and risk factor (it can be negative in meningitis)
- Radiological assessment if needed

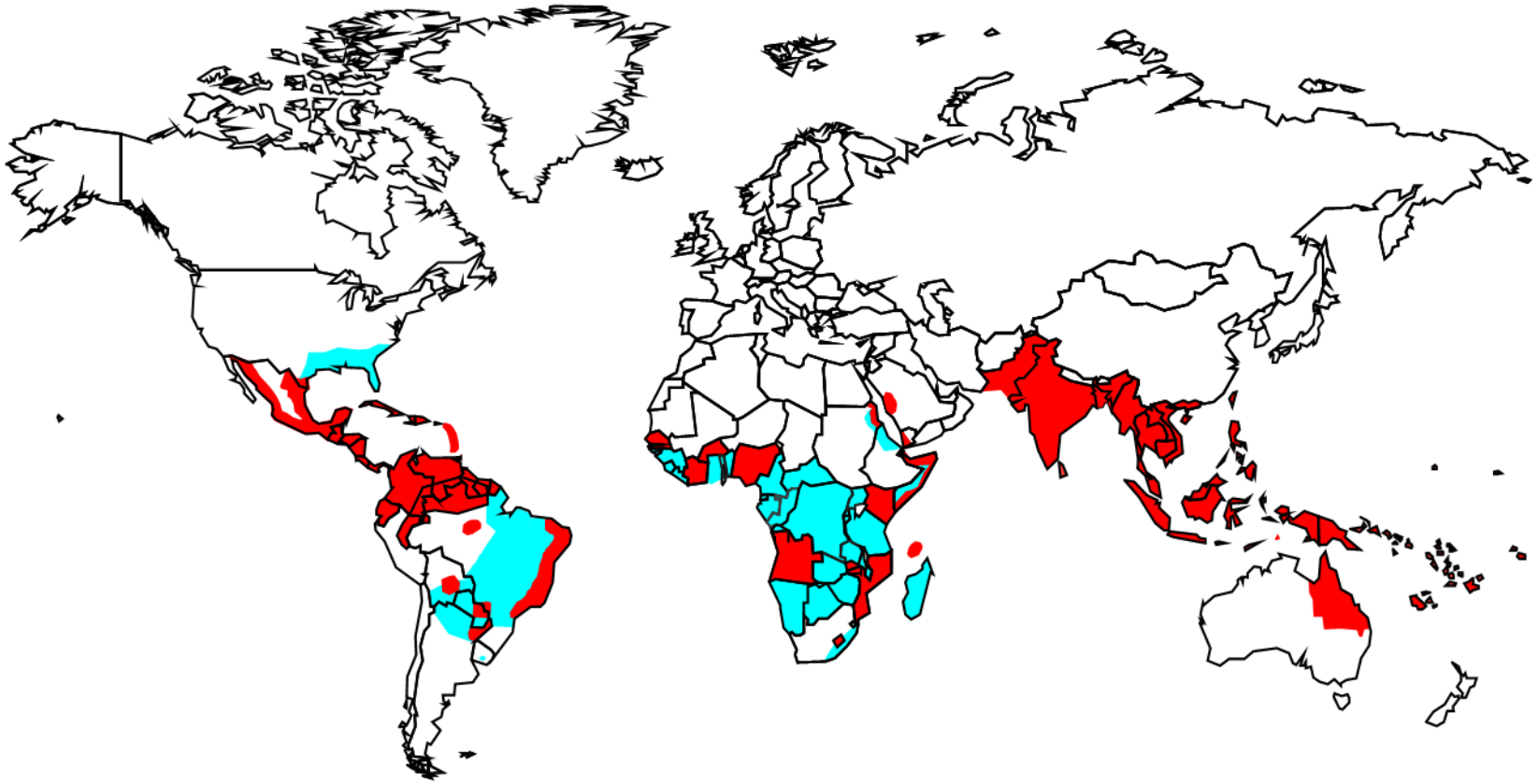
Treatment

- Treatment for uncomplicated Brucellosis
  - Streptomycin (14 days) + Doxycycline for 6 weeks
  - Rifampicin + Doxycycline for 6 weeks
- Treatment of complicated Brucellosis
  - Endocarditis, meningitis
  - No uniform agreement
  - Usually 3 anti Brucella drugs for 3 or more months

Relapse vs Re infection

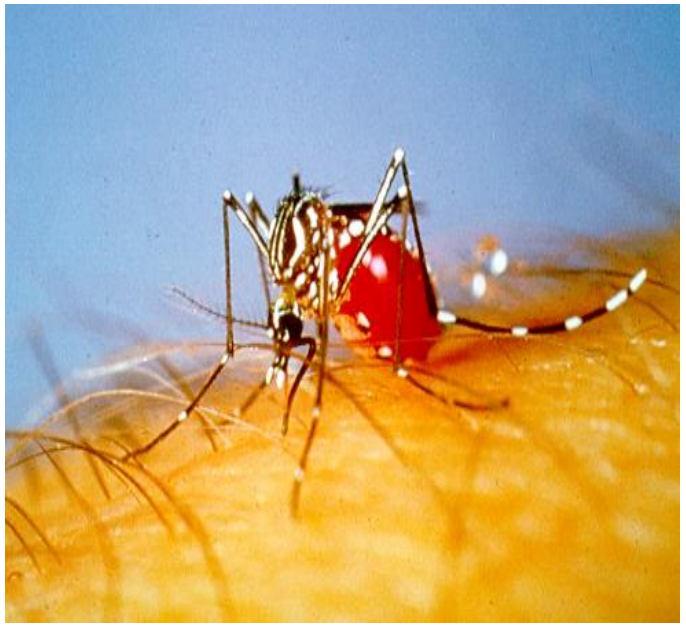
- About 10 percent of patients relapse after therapy.
- Most relapses occur within three months following therapy and almost all occur within six months.
- Relapse should prompt assessment for a focal lesion
- Most relapses can be treated successfully with a repeat course of a standard regimen.
- Reinfection because ongoing risk factor

Viral hemorrhagic Fevers:
Dengue



Dengue Virus

- Causes dengue and dengue hemorrhagic fever
- Is an arbovirus
- Transmitted by mosquito: Aedes Aegypti
- Composed of single-stranded RNA
- Has 4 serotypes (DEN-1, 2, 3, 4)

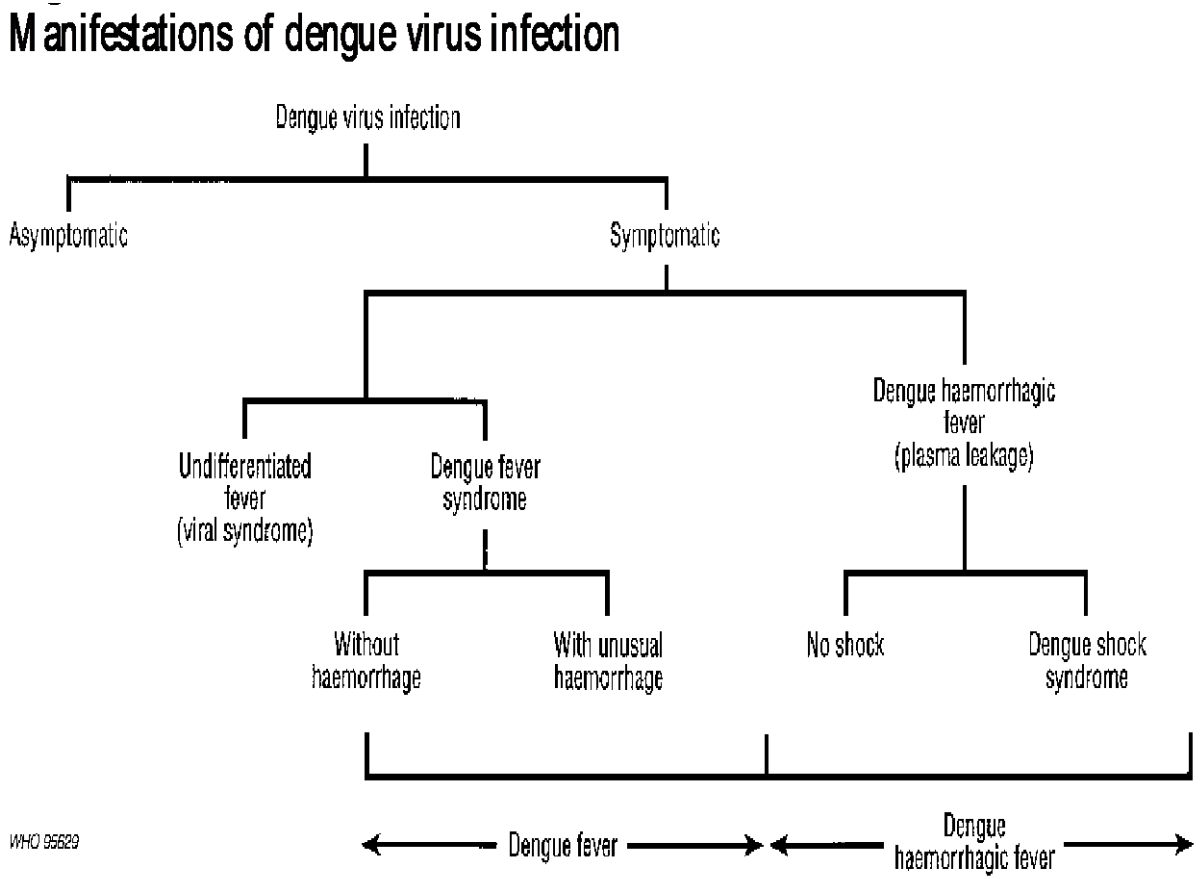


Four Dengue Virus Serotypes (DEN 1,2,3, and 4)

- All can cause severe & fatal infection
- Infection by one serotype gives No cross immunity to other types but life long immunity to the same type, however, more predisposition to DHF/DSS if infected by another serotype.
- 2o immunopathological mechanism triggered by sequential infections with different dengue viral serotypes.
- Complicated pathogenesis – partially attributable to Ab-dependent enhancement.
- Humans are the main reservoir but monkeys may be.

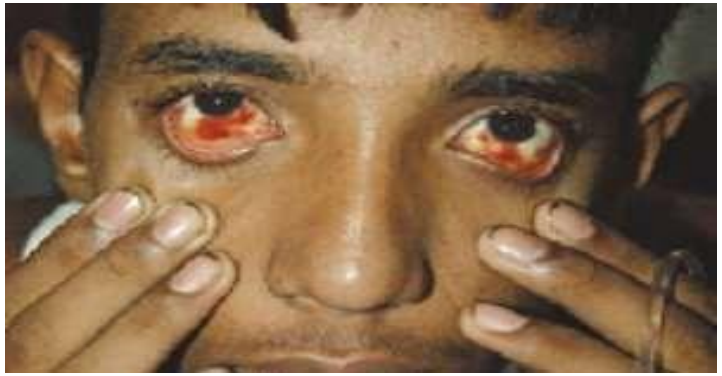
Dengue Clinical Syndromes

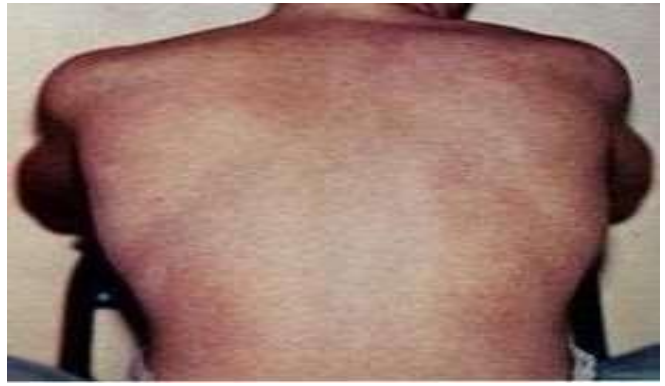
- Undifferentiated fever
- Classic dengue fever
- Dengue hemorrhagic fever
- Dengue shock syndrome



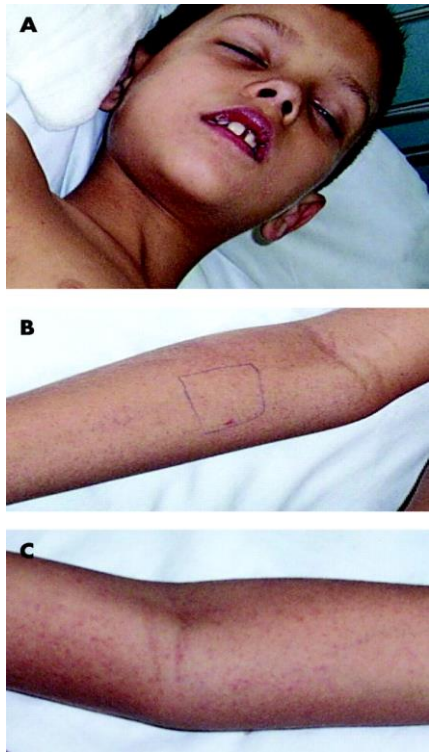
- Classic Dengue Fever

- Acute febrile illness
- Severe Hemorrhage mainly retro-ocular;
- Myalgia & arthralgia – often severe (breakbone fever);
- Nausea & vomiting > 50%; diarrhea (30%)
- **Rash (50%)** (of variable appearances; maculopapular, petechial, or erythematous.





Dengue Hemorrhagic Fever (DHF):



- Most serious form of dengue infection
- WHO estimates 500,000 cases /year
- Mortality ≈ 10%; high as 50%

- WHO 4 diagnostic criteria (Fever (2-7 days) – Hemorrhagic manifestations – Low platelet counts (< 100000 /ml) – evidence of leaky capillaries)

Pathogenesis of Dengue:

•Dengue virus after entering in the body invades the local macrophages and multiply there.

•Infected local cells then migrate from site of infection to lymph nodes, where monocytes and macrophages are recruited, which become targets of infection.

•Consequently, infection is amplified and virus is disseminated through the lymphatic system. As a result of this primary viremia, several cells of the mononuclear lineage, including blood-derived monocytes

•Viremia develops within 24 hours. During this period, virus travels throughout the body.

•Bone marrow cells have also been shown to be susceptible to infection with DENV

•In severe case, viral load is very high and many vital organs are affected.

•Virus infected macrophages produces a number of signaling proteins such as interferons, cytokines, chemokines, TNF, other mediators which are responsible for many symptoms such as flue like syndrome and pain.

•These mediators affects hemostatic system of body.

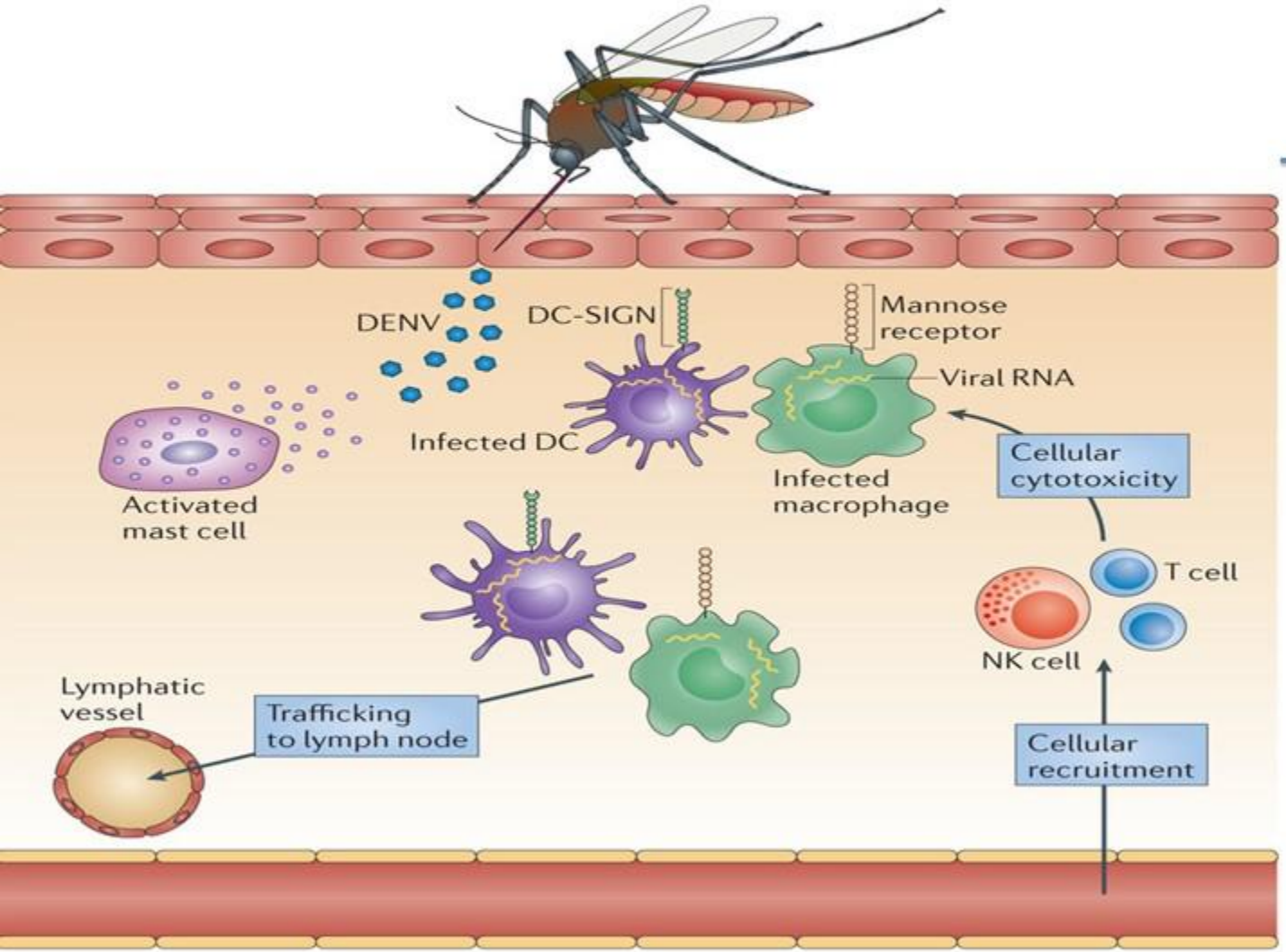
•Fluid from blood vessels starts to leak out so that the blood volume decreases resulting in low blood pressure.

•Decrease in blood pressure causes insufficient supply of blood and Oxygen to vital organs such as brains.

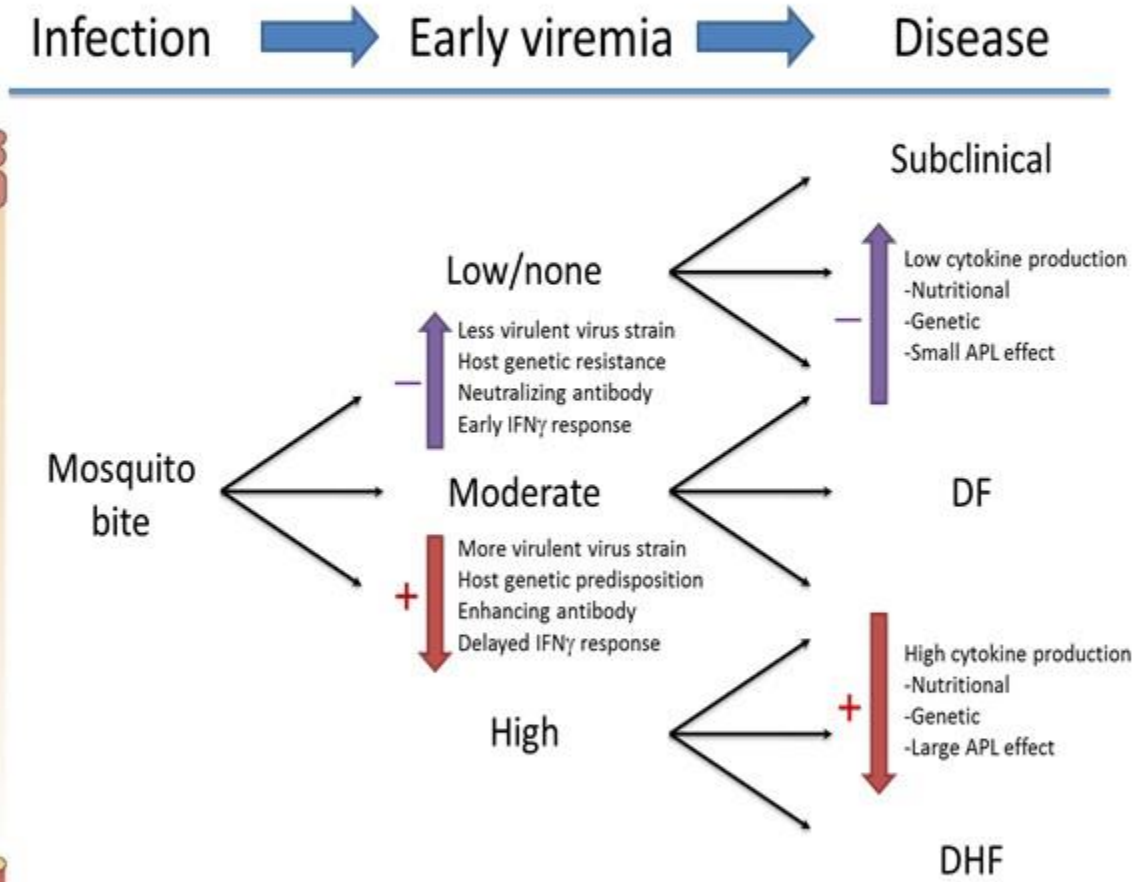
•Dengue also infects bone marrow, so that bone marrow cannot produces sufficient platelets.

•Since platelets are needed for blood clotting, dengue infection causes blood clotting defect and increase the risk of bleeding.

Dengue Pathogenesis and diseases



Nature Reviews | Microbiology



Prevention

- Elimination & destruction of mosquitos and larval habitat:
  - Space Spraying of insecticide is not usually effective.
  - Spraying residual insecticides in-door.
  - Larval source reduction : Cover water holding containers.
- Personal protection against mosquito biting:
  - Screening
  - Protective clothing
  - Repellents
- Centralized, vertically-structured programs with military-type organization, strict supervision, high level of discipline.
- Vaccine

Treatment

- Symptomatic treatment
- Hydration
- Avoid NSAIDS or Aspirin, only acetaminophen for fever, headache or arthralgia
- Platelet transfusion only if platelets <10-20

Rift Valley Fever

What is Rift Valley fever?

- Rift Valley fever (RVF) is an acute, fever-causing viral disease that affects domestic animals (such as cattle, buffalo, sheep, goats, and camels) and humans.
- RVF is most commonly associated with mosquito-borne epidemics during years of unusually heavy rainfall.
- The disease is caused by the RVF virus, a member of the genus Phlebovirus in the family Bunyaviridae.
- The disease was first reported among livestock by veterinary officers in Kenya in the early 1900s.

Rift Valley Fever

On 11 September 2000, the Ministry of Health (MOH) of the Kingdom of Saudi Arabia (Riyadh) received reports of unexplained severe hepatitis in 7 patients from the Jizan region at the southwestern border of Saudi Arabia.

A team from the MOH started investigations within 24 h after notification.

Clinical manifestations included low-to-moderate–grade fever, abdominal pain, vomiting, diarrhea, and elevated liver enzyme levels progressing to liver failure, encephalopathy or encephalitis, disseminated intravascular coagulation (DIC), renal failure, and, in 5 of the 7 patients, death.

Rift Valley Fever

- Next outbreak was reported in Yemen.
- Now Rift valley fever is considered to be at a low level of endemicity in Saudi Arabia
- Treatment is symptomatic
- Vaccines for veterinary use are available

Alkhurma hemorrhagic fever

- Alkhurma hemorrhagic fever (AHF) is caused by Alkhurma hemorrhagic fever virus (AHFV), a tick-borne virus of the Flavivirus family.
- The virus was initially isolated in 1995 from a patient in Saudi Arabia. Subsequent cases of AHF have been documented in tourists in Egypt, extending the geographic range of the virus and suggesting that geographic distribution of the virus is wide and that infections due to AHFV are underreported.

Transmission

- Transmission of AHFV is not well understood.
- AHFV is a zoonotic virus, and its described tick hosts (the soft tick *Ornithodoros savignyi* and the hard tick *Hyalomma dromedari)* are widely distributed. People can become infected through a tick bite or when crushing infected ticks. Epidemiologic studies indicate that contact with domestic animals or livestock may increase the risk of human infection. No human-to-human transmission of AHF has been documented.
- Although livestock animals may provide blood meals for ticks, it is thought that they play a minor role in transmitting AHFV to humans. No transmission through non-pasteurized milk has been described, although other tick-borne flaviviruses have been transmitted to humans through this route.

Signs and Symptoms

- after an incubation period that could be as short as 2-4 days, the disease presents initially with non- specific flu-like symptoms, including fever, anorexia (loss of appetite), general malaise, diarrhea, and vomiting; a second phase has appeared in some patients, and includes neurologic and hemorrhagic symptoms in severe form. Multi-organ failure precede sfatal outcomes. No repeated or chronic symptoms have been reported following recovery. Evidence suggests that a milder form may exist, where hospitalization is not required.

Risk of Exposure

- Contact with livestock with tick exposure are risk factors for humans, as is contact with infected ticks, whether through crushing the infected tick with unprotected fingers or by a bite from an infected tick. Slaughtering of animals which may acutely but asymptomatically infected may also be a risk factor, as it is possible that infected animals develop a viremia without obvious clinical signs.

Diagnosis

- Clinical diagnosis could be difficult due to similarities between AVHF, Crimean-Congo Hemorrhagic fever (CCHF), and Rift Valley fever (RV F) , which occur in similar geographic areas . Laboratory diagnosis of AHF can be made in the early stage of the illness by molecular detection by PCR or virus isolation from blood. Later, serologic testing using enzyme-linked immunosorbent serologic assay (ELISA) can be performed.

Treatment

- There is no standard specific treatment for the disease. Patients receive supportive therapy, which consists of balancing the patient's fluid and electrolytes, maintaining oxygen status and blood pressure, and treatment for any complications. Mortality in hospitalized patients ranges from 1-20%.

Prevention

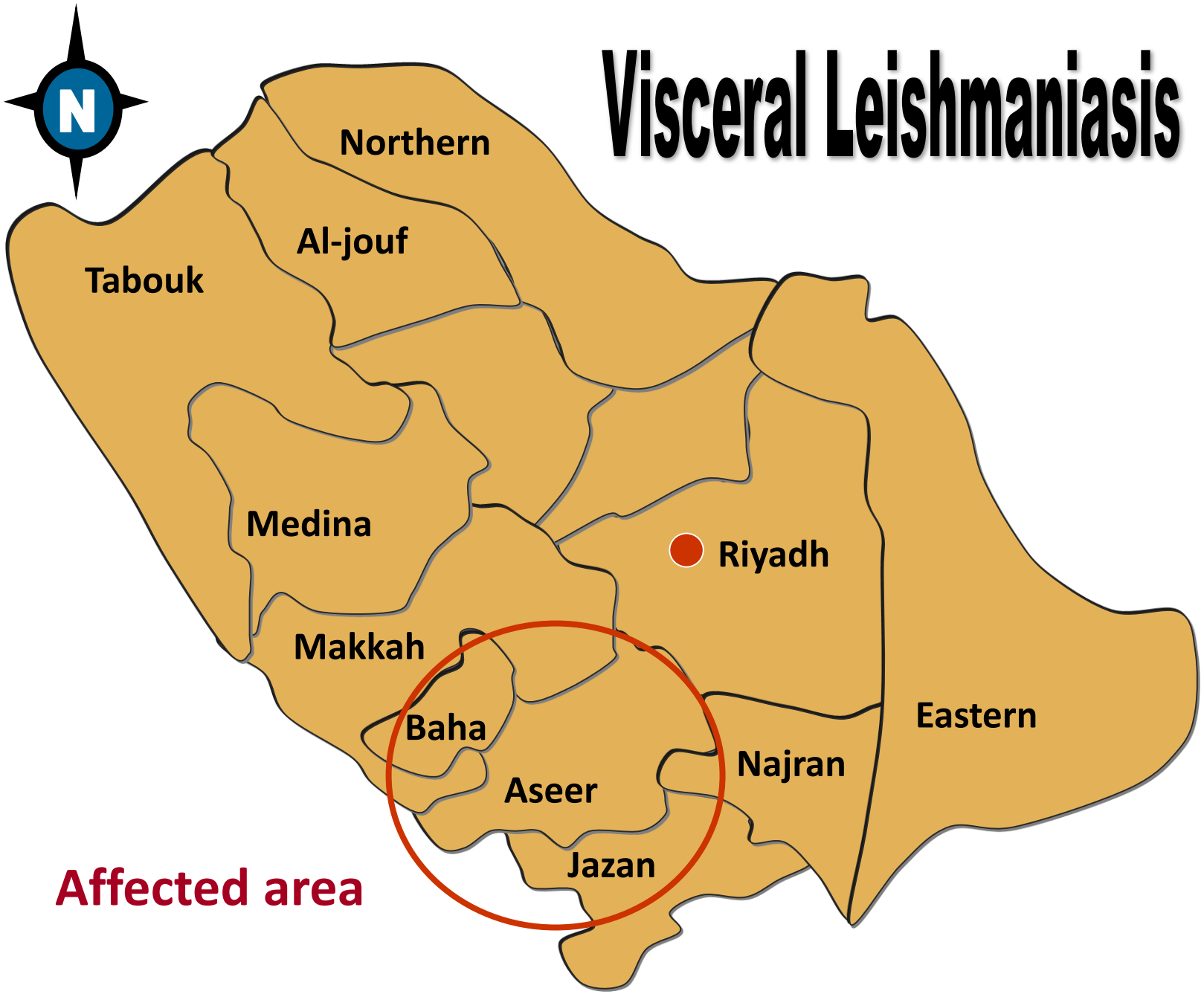
- Given that no treatment or specific prophylaxis is presently available, prevention and increased awareness of AHFV are the only recommended measures. Complete control of ticks and interruption of the virus life cycle is impractical; in endemic regions, it is important to avoid tick-infested areas and to limit contact with livestock and domestic animals.
- Individuals should use tick repellants on skin and clothes and check skin for attached ticks, removing them as soon as possible. Tick collars are available for domestic animals, and dipping in acaricides is effective in killing ticks on livestock. People working with animals or animal products in farms or slaughterhouses should avoid unprotected contact with the blood, fluids, or tissues of any potentially infected or viremic animals.

Leishmaniasis

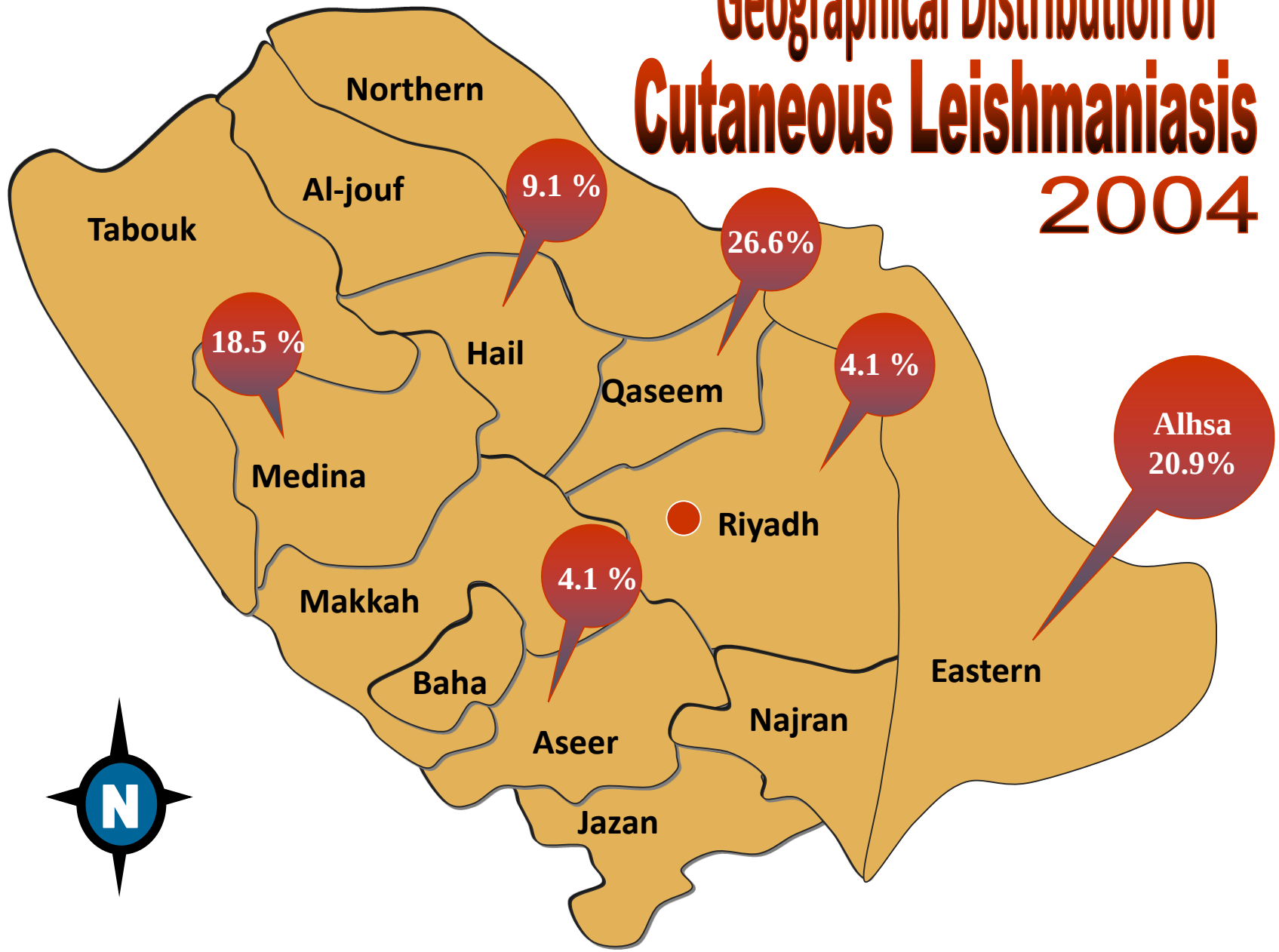
Leishmaniasis is a protozoal disease caused by Leishmania parasite, which is transmitted by the sand fly.

Leishmaniasis is of three types ; **cutaneous leishmaniasis**, **muco-cutaneous** and the **visceral** (Kala-azar)

Visceral Leishmaniasis



Geographical Distribution of Cutaneous Leishmaniasis 2004



Leishmaniasis Life-Cycle

Sand fly Stages

Human Stages

1 Sand fly takes a blood meal
(Injects promastigote
stage into the tissue)

2 Promastigotes are
Phagocytized by
macrophages

3 Promastigotes transfer
into amastigotes inside
macrophages

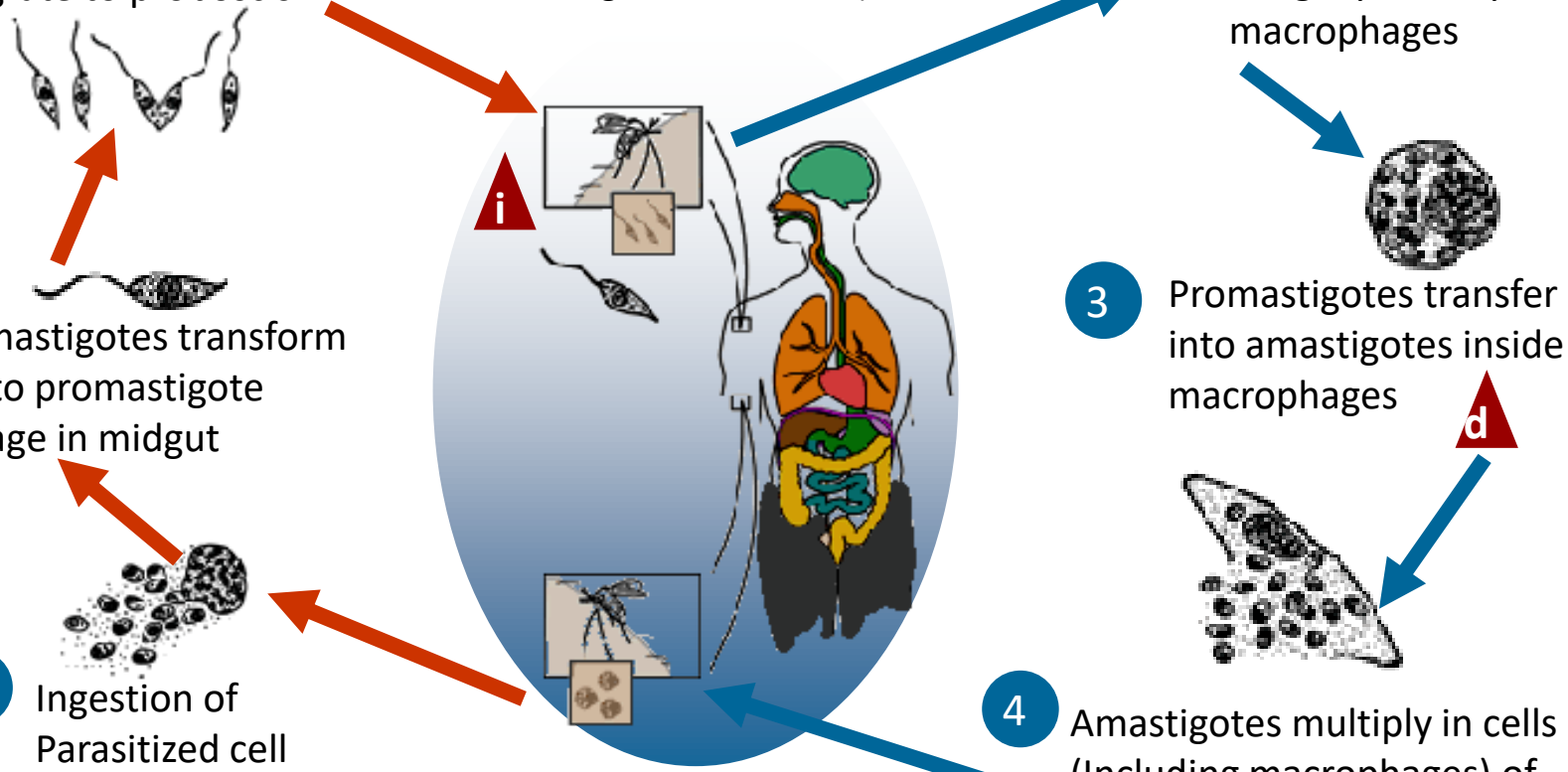
4 Amastigotes multiply in cells
(Including macrophages) of
Various tissues

5 Sand fly takes
a blood meal
(ingest macrophages
Infected with amastigotes)

6 Ingestion of
Parasitized cell

7 Amastigotes transform
Into promastigote
stage in midgut

8 Divide in midgut and
migrate to proboscis



i **Infective stage**

d **Diagnostic stage**

VL in KSA

VL in KSA caused by L.Donovani and the Rattus rattus is the reservoir.

CLINICAL MANIFESTATIONS

1. **Asymptomatic infection**
2. **Visceral leishmaniasis** The most important clinical manifestation of VL is the syndrome known as kala-azar (Hindi for "black fever").

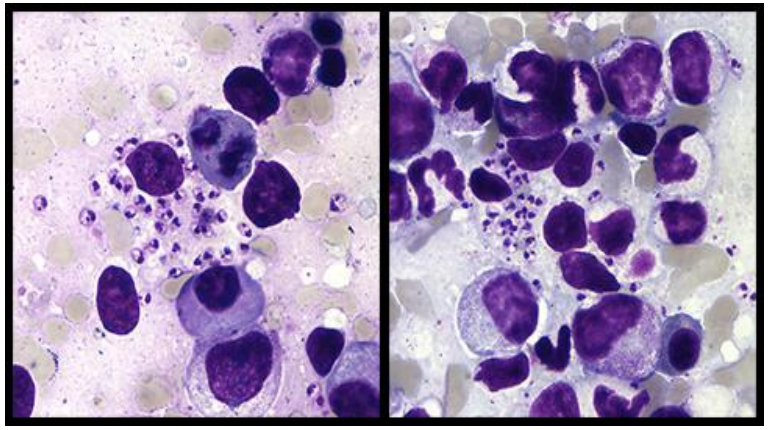
The incubation period is usually two to six months but can range from a few weeks to several years.

Onset of symptoms is usually insidious or subacute, with slow progression of malaise, fever, weight loss, and splenomegaly (with or without hepatomegaly) over a period of weeks to months

Hemophagocytic lymphohistiocytosis Hemophagocytic lymphohistiocytosis (HLH) is a systemic disorder of excess immune activation that can be triggered by certain infections it is an uncommon complication of VL

Diagnostic tools of VL

- **Histopathology** diagnosis requires visualization of amastigotes; these are spherical or ovoid bodies that measure 1 to 5 microns long by 1 to 2 microns wide.
- **Culture**Typical liquid media consists of Schneider's drosophila media supplemented with calf serum, or Novy, MacNeal, Nicolle (NNN) media.
- **Molecular techniques** Polymerase chain reaction is one of the most sensitive diagnostic tests for VL



Visceral leishmaniasis: Treatment

- Liposomal amphotericin B is the drug with the highest therapeutic efficacy and the most favorable safety profile monotherapy (total dose 20 to 21 mg/kg
- The pentavalent antimonial drugs sodium stibogluconate(SSG) and meglumine antimoniate, are still widely used; however, monotherapy with antimonial agents is no longer a first-line treatment for VL
- Two new drugs have been added paromomycin and miltefosine

Cutaneous Leishmaniasis in KSA

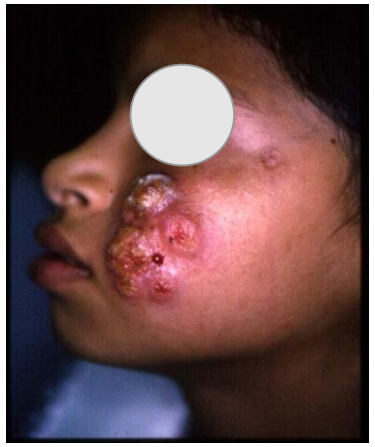
- The disease is endemic in many parts of KSA, with the majority of cases concentrated in six regions, including Al-Qaseem, Riyadh, Al-Hassa, Aseer, Ha'il, and Al-Madinah.
- Leishmania major (L. major) and Leishmania tropica (L. tropica) are the main dermotropic species, and Phlebotomus papatasi (vector of L. major) and Phlebotomus sergenti (vector of L. tropica) are the proved vectors of the disease.
- Psammomys obesus and Meriones libycus have been defined as the principal reservoir hosts of zoonotic CL in Al-Hassa oasis, Al-Madinah, and Al-Qaseem provinces.
- Clinically, males are affected more than females, and there is no variation between the Saudis and expatriates in terms of number of reported cases, but the disease tends to run a more severe course among non-Saudis.
- Face is the most commonly affected site, and ulcerative pattern accounts for 90% of lesions.

Phlebotomus papatasi

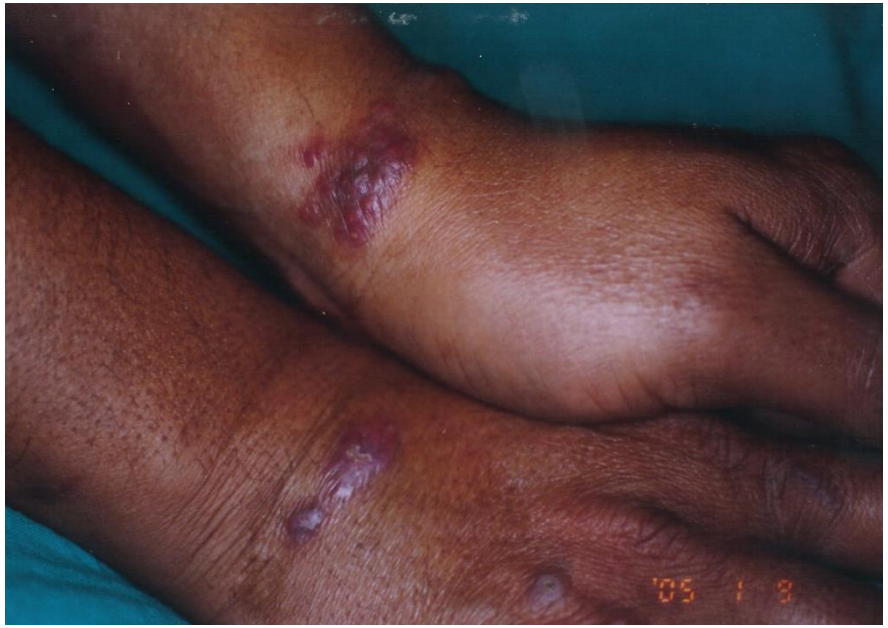
Psammomys obesus

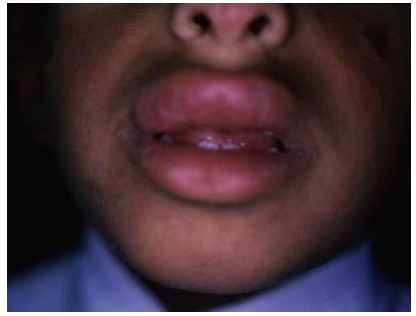
Meriones libycus

Types of Cutaneous Leishmaniasis

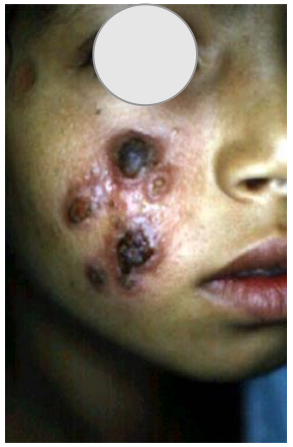


Hyperkeratotic

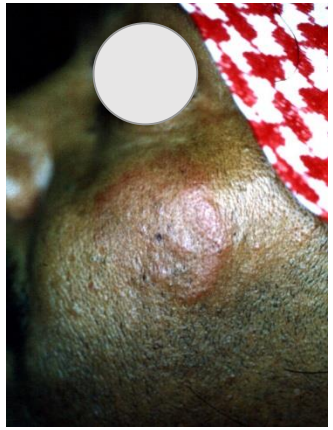




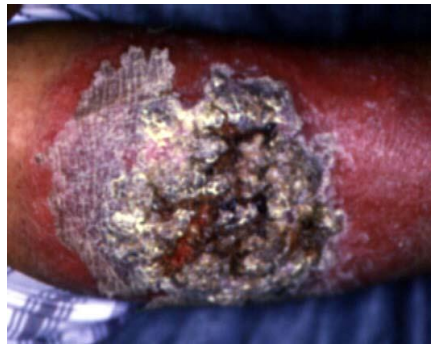
Mucosal



Plaque



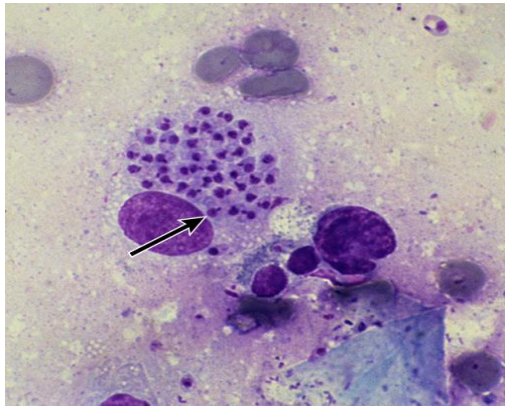
Recidivans



Erysipeloid

Cutaneous leishmaniasis Diagnostic tools

- **Histopathology :**Giemsa staining is typically used; with this stain, the cytoplasm is blue, the nucleus violet-blue, and the kinetoplast red to violet
- **Culture** Typical liquid media consists of Schneider's drosophila media supplemented with calf serum, or Novy, MacNeal, Nicolle (NNN) media.
- **Molecular techniques** Polymerase chain reaction is one of the most sensitive diagnostic tests for CL



DIFFERENTIAL DIAGNOSIS of CL

- Sporotrichosis
- Mycobacterial infection
- Leprosy
- Skin cancer

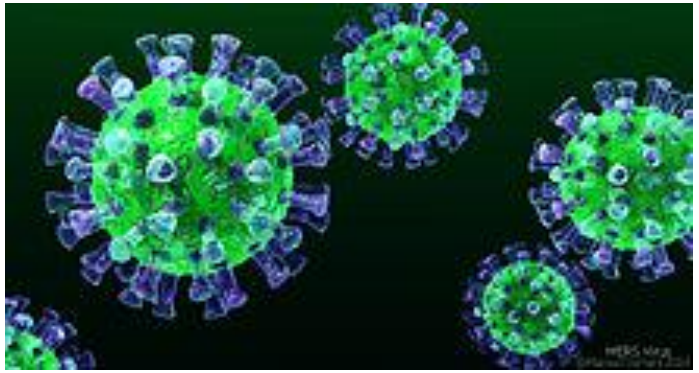
Cutaneous leishmaniasis: Treatment

- CL due to L. major may heal spontaneously within 4–6 months in 50–75% of cases and almost in all patients at 8 months,
- while in L. tropica spontaneous healing occurs within 1 year or longer
- Therapeutics for CL consist of local/topical (paromomycin ointment, imidazole ointment.
- local infiltration of lesion with antimonials (sodium antimony gluconate; Pentostam)

Preventions

- NO pre or post exposure prophylaxis
- Effective prevention requires health education regarding risk of infection and epidemiology of transmission.
- Covering skin with clothing is helpful as sand fly mouthparts do not penetrate clothing (in contrast, mosquito mouthparts do penetrate clothing).
- Clothing can be impregnated with an insecticide such as permethrin.
- An insect repellent such as DEET (NN-diethyl-3-methylbenzamide) can be applied to exposed skin areas.
- Use of fine mesh insecticide-treated bednets may also be helpful

MERS CoV



MIDDLE EAST RESPIRATORY SYNDROME CORONAVIRUS

MERS CoV

OUTBREAK :

-2012 emerged in Saudi Arabia

-2014 March -April increased dramatically in Arabian Peninsula → declined sharply in ensuing months. → still detected cases

-2015 May -early July : in South Korea : large outbreak (the index case was an individual who had traveled to the Arabian Peninsula)

-2015: large outbreak began in a hospital in Riyadh, Saudi Arabia

Where Does the Virus Come From?

- Partial sequence found in bat in Saudi Arabia near location of human case
- Growing evidence that camels play an important role in transmission across the region
- Virus has been detected in dromedary camels in:
  - Qatar, Saudi Arabia and Egypt
- Antibodies have been found in camels in: (? Crosse reactivity !!)
  - Jordan, Tunisia, Ethiopia, Nigeria, Egypt, Saudi Arabia, Canary Islands, UAE
- MERS-CoV likely widespread in camels throughout region
- Transmission likely occurring from camel to human

II. Case definition and surveillance guidance [2]

Suspect case (patients who should be tested for MERS-CoV)[1,2]

I. A person with fever and community-acquired pneumonia or acute respiratory distress syndrome based on clinical or radiological evidence.[3]
OR

II. A hospitalized patient with healthcare associated pneumonia based on clinical and radiological evidence.[3]
OR

III. A person with 1) acute febrile (≥38°C) illness, **AND** 2) body aches, headache, diarrhea, or nausea/vomiting, with or without respiratory symptoms, **AND** 3) unexplained leucopenia (WBC<$3.5x10^9$/L) and thrombocytopenia (platelets<$150x10^9$/L)[4].
OR

IV. A person (including health care workers) who had protected or unprotected exposure[5] to a confirmed or probable case of MERS-CoV infection and who presents with upper[6] or lower[7] respiratory illness within 2 weeks after exposure.[8]

MERS CoV: Diagnosis and Treatment

DIAGNOSIS:

Real-time reverse-transcriptase polymerase chain reaction (rRT-PCR) for respiratory secretions

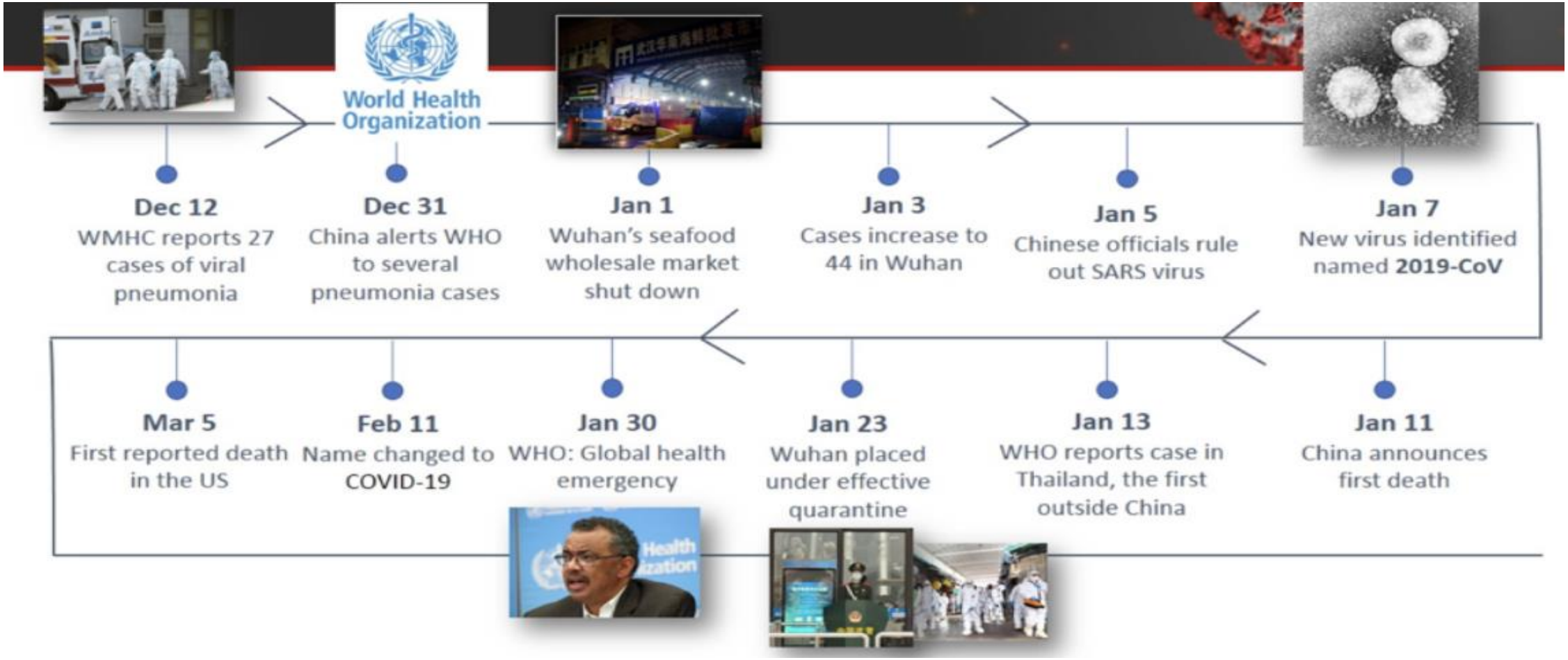
EXPERIMENTAL TREATMENT:

- Convalescent plasma
- IVIG
- IFN
- Protease Inhibitors used In HIV infection
- Ribavirin
- Corticosteroids
- Nitazoxanide
- Cyclosporin A
- Combination therapy

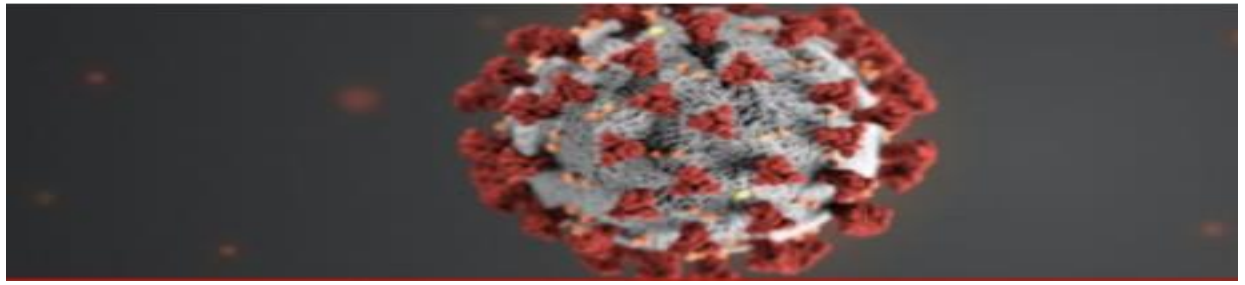
Treatment is mainly SUPPORTIVE

No vaccine available yet

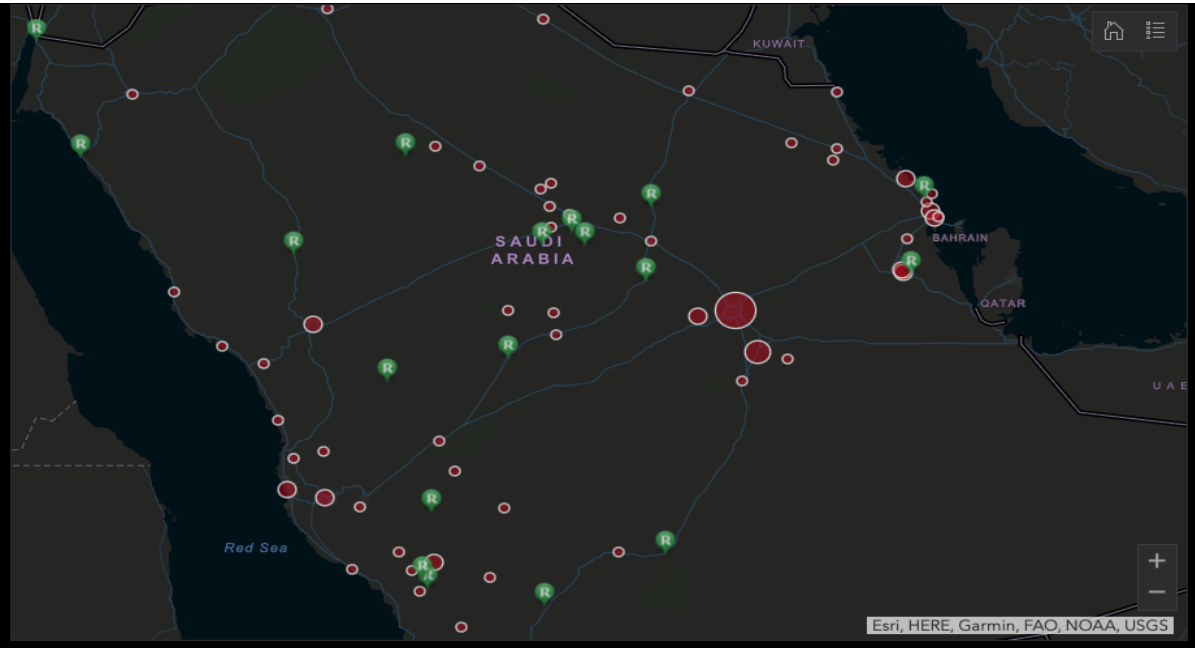
COVID-19 timeline



COVID-19 Current situation



المتعافون	الحالات الجديدة
249	353
الرياض: 80	الرياض: 115
الدمام: 13	الدلم: 26
المدينة المنورة: 12	جدة: 17
جدة: 11	العقيق: 17
القطيف: 11	الجبيل: 11
الخبر: 7	الدمام: 10
الظهران: 7	الهفوف: 10
بريدة: 6	المدينة المنورة: 9
مكة المكرمة: 6	مكة المكرمة: 8
نجران: 6	ضرما: 8



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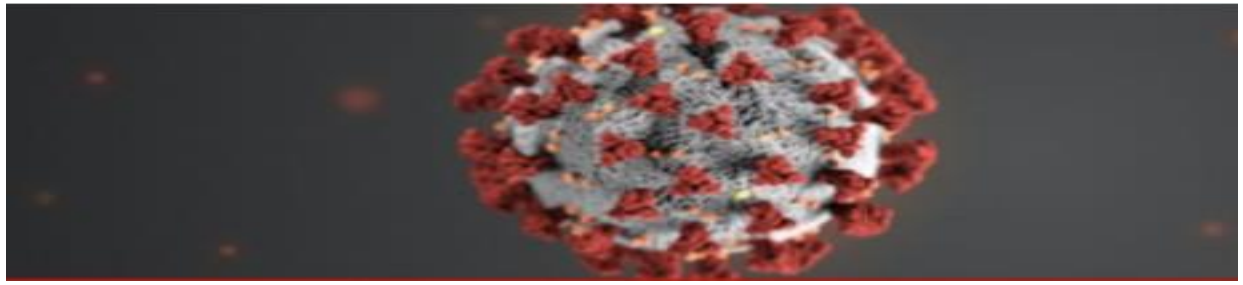
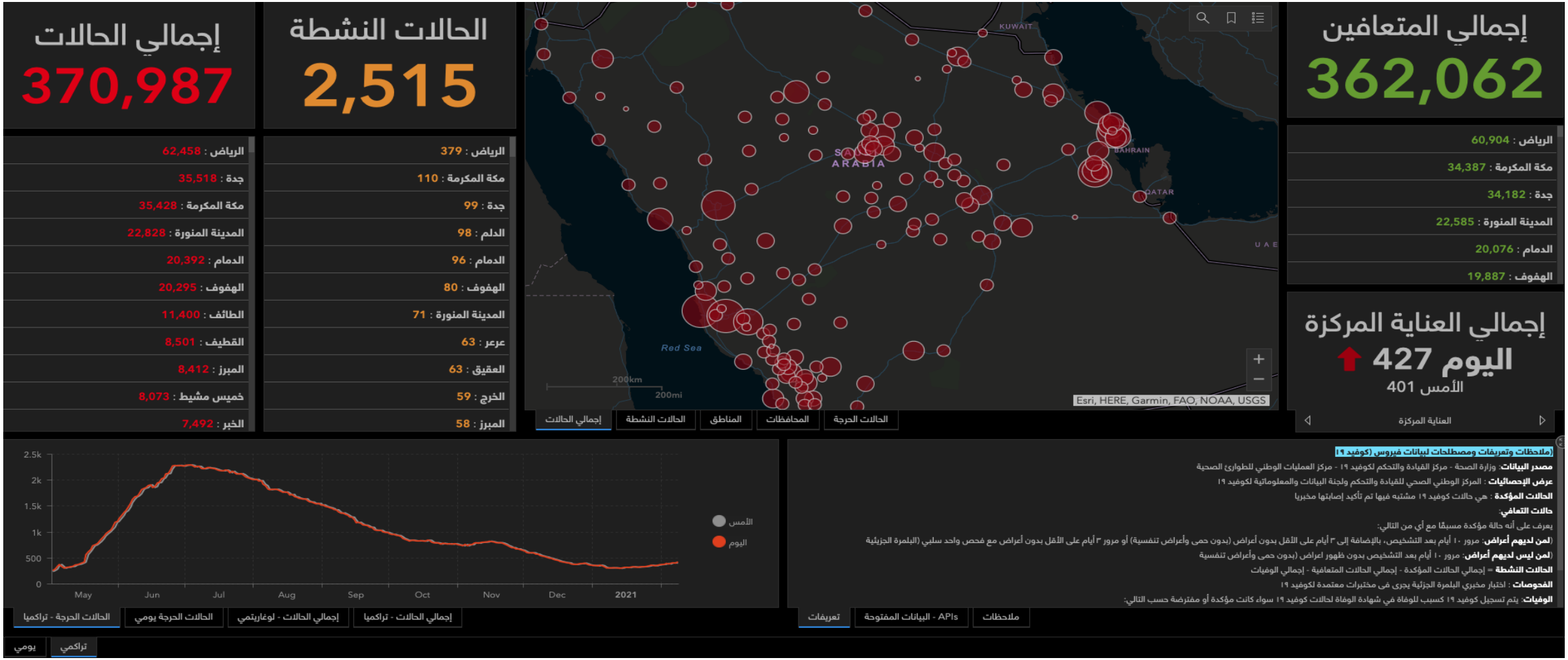
الوفيات
4

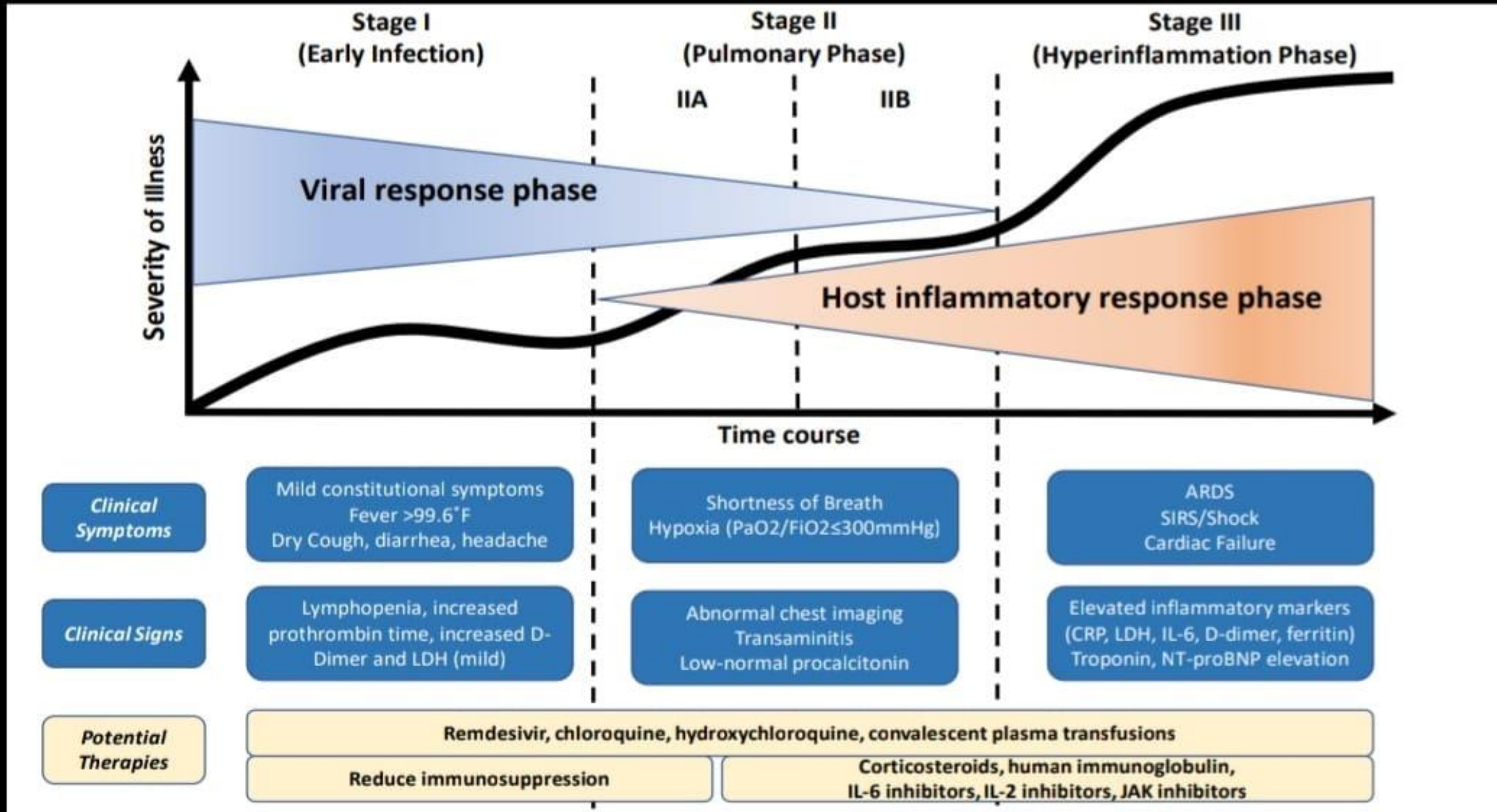
الفحوصات
53,039

العناية المركزة
26

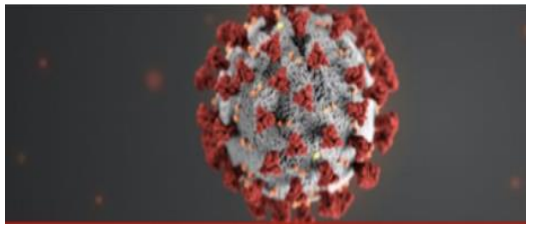
COVID-19 Current situation






Stage I
(Early Infection)
Stage II
(Pulmonary Phase)
Stage III
(Hyperinflammation Phase)
IIA
IIB
Severity of Illness
Viral response phase
Host inflammatory response phase
Time course
Clinical Symptoms
Mild constitutional symptoms
Fever >99.6˚F
Dry Cough, diarrhea, headache
Shortness of Breath
Hypoxia (PaO2/FiO2≤300mmHg)
ARDS
SIRS/Shock
Cardiac Failure
Clinical Signs
Lymphopenia, increased prothrombin time, increased D-Dimer and LDH (mild)
Abnormal chest imaging
Transaminitis
Low-normal procalcitonin
Elevated inflammatory markers
(CRP, LDH, IL-6, D-dimer, ferritin)
Troponin, NT-proBNP elevation
Potential Therapies
Remdesivir, chloroquine, hydroxychloroquine, convalescent plasma transfusions
Reduce immunosuppression
Corticosteroids, human immunoglobulin,
IL-6 inhibitors, IL-2 inhibitors, JAK inhibitors

Case definition



وزارة الصحة
Ministry of Health

وقايـــة
Weqaya
المركـز الوطنـي للوقـايـة من الأمـراض ومكـافحتهـا
Saudi Center for Disease Prevention and Control

3. SURVEILLANCE CASE DEFINITIONS

3.1 Definition of COVID-19 Suspected Cases

Clinical Presentation	Criteria
1. Patient with acute respiratory illness (sudden onset of at least one of the following: fever[1] (measured or by history), cough, or shortness of breath	Not required
2. Patient with sudden onset of at least one of the following: headache, sore throat, rhinorrhea, nausea, diarrhea or loss of smell or taste. **AND** in the 14 days prior to symptom onset, met at least one of the following criteria	• Had contact[2] with a confirmed COVID-19 case **Or** • Working in or attended a healthcare facility where patients with confirmed COVID-19 were admitted.
3. Any admitted adult patient with unexplained sever acute respiratory infection (SARI), either Community Acquired Pneumonia (CAP) or Hospital Acquired Pneumonia (HAP).	Not required

3.2 Definition of COVID-19 Confirmed Cases

A person who meets the suspected case definition with laboratory confirmation of COVID-19 infection (PCR).

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Saudi Center for Disease Prevention and Control

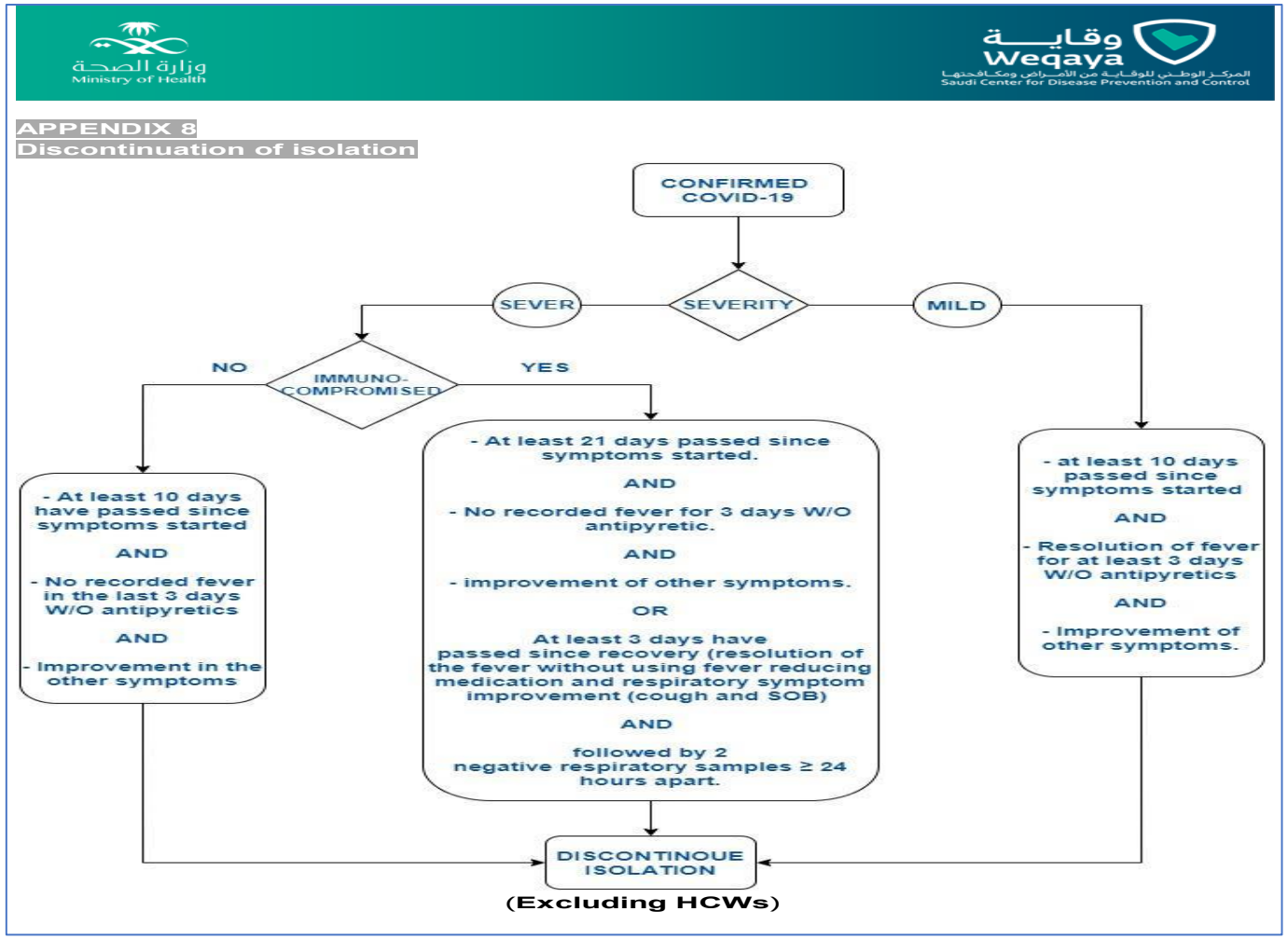
7. Criteria for Recovery and Discontinuing Isolation

7.1 Confirmed Cases

Patient Status	Description	instructions
Severe infection	**Patients who are hospitalized at noncritical wards with laboratory confirmed COVID-19**	**Isolation should last until all of the following criteria are fulfilled**: • At least 10 days have passed since the onset of symptoms AND no recorded fever in the last 3 days without the use of antipyretics AND improvement of other symptoms (Cough, SOB and GI symptoms). - Patient can be discharged before recovery based on clinical criteria, per evaluation of the treating physician, home- isolation should be continued until fulfilled the recovery criteria.
	Immunocompromised* and critical cases (ICU admitted patients)	**Isolation should last until one of the following criteria are fulfilled:** At least 21 days after symptom onset AND resolution of fever for at least 3 days, AND clinical improvement of symptoms other than fever (Cough, SOB and GI symptoms). **OR** At least 3 days have passed since **recovery** (resolution of the fever without using fever reducing medication and symptom improvement (Cough, SOB and GI symptoms) AND followed
Mild confirmed cases	**Confirmed COVID-19 patients never hospitalized due to mild symptoms or asymptomatic presentation**	These patients can end self-isolation 10 days after the onset of symptoms **AND** resolution of fever for at least 3 days AND clinical improvement of other symptoms. For asymptomatic lab-confirmed cases 10 days have passed since the date of collection of the respiratory sample with the first positive PCR result.

*Neutropenia (absolute neutrophils count <500/mm3), leukemia or lymphoma, HIV with CD4 count < 200, Splenectomy, Early post-transplant, Cytotoxic chemotherapy, on high dose steroid therapy: >40 mg prednisone or its equivalent (>160 mg hydrocortisone, >32 mg methylprednisolone, >6 mg dexamethasone, >200 mg cortisone) daily for > 2 weeks.

COVID-19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Weqaya
المركز الوطني للوقاية من الأمراض ومكافحتها
Saudi Center for Disease Prevention and Control
APPENDIX 8
Discontinuation of isolation
CONFIRMED COVID-19
SEVERITY
SEVER
MILD
NO
IMMUNO-COMPROMISED
YES
- At least 10 days have passed since symptoms started
AND
- No recorded fever in the last 3 days W/O antipyretics
AND
- Improvement in the other symptoms
- At least 21 days passed since symptoms started.
AND
- No recorded fever for 3 days W/O antipyretic.
AND
- improvement of other symptoms.
OR
At least 3 days have passed since recovery (resolution of the fever without using fever reducing medication and respiratory symptom improvement (cough and SOB)
AND
followed by 2 negative respiratory samples ≥ 24 hours apart.
- at least 10 days passed since symptoms started
AND
- Resolution of fever for at least 3 days W/O antipyretics
AND
- Improvement of other symptoms.
DISCONTINOUE ISOLATION
(Excluding HCWs)

Respiratory Triage Checklist

Respiratory Triage Checklist

Date: Time

Name: Hospital:

Circle the number reflecting the patient's condition (exposure and clinical picture) and calculate the final score:

Risks for Acute Respiratory Illnesses	**Score**	
A. Exposure Risks	***Any Patient (Adult or Pediatric)***	
A history of travel abroad during the 14 days prior to symptom onset. **OR** Visiting or being a resident of a high-risk area for COVID-19 in the kingdom during the 14 days prior to symptom onset*. **OR** A close physical contact with a confirmed case of COVID-19 or MERS-CoV in the past 14 days. **OR** An exposure to camel or camel's products (direct or indirect**) in the past 14 days. **OR** Working in a healthcare facility.	3	
B. Clinical Signs and Symptoms and Medical History	***Pediatric***	***Adult***
1. Fever or recent history of fever.	1	2
2. Cough (new or worsening).	1	2
3. Shortness of breath (new or worsening).	1	2
4. Nausea, vomiting, and/or diarrhea.	-	1
5. Chronic renal failure, CAD/heart failure, Immunocompromised patient.	-	1
Total Score		

* As determined and announced by the Ministry of Interior or Ministry of Health. Updated regularly on: www.covid19.cdc.gov.sa

** Patient or household

A score ≥ 4, ask the patient to perform hand hygiene, wear a surgical mask, direct the patient through the respiratory pathway and inform MD for assessment.

MRSE-CoV OR COVID-19 testing should be only done according to case definitions.

Staff name: ______________________________ Signature: ______________________

نموذج فحص الفرز التنفسي

التاريخ: الوقت:

الاسم: المستشفى:

ضع دائرة حول الرقم الذي يعكس حالة المريض (مخاطر التعرض والأعراض والعلامات السريرية والتاريخ المرضي) واحسب مجموع التقييم النهائي:

عوامل الخطورة لأمراض الجهاز التنفسي الحادة	**الدرجة**	
أ. عوامل الخطورة	أي مريض (بالغ او طفل)	
• تاريخ سفر للخارج خلال الـ 14 يوماً من قبل ظهور الأعراض او • الإقامة أو زيارة أحد المناطق عالية الخطورة لكوفيد 19 في المملكة خلال الـ 14 يوماً من قبل ظهور الأعراض* او • الاتصال الوثيق مع حالة مؤكدة من COVID-19 أو MERS-CoV في الـ 14 يوماً الماضية. او • التعرض للجمال او منتجاتها بشكل مباشر أو غير مباشر** (في الـ 14 يوماً الماضية. او • العمل في منشأة صحية	3	
ب. الأعراض والعلامات السريرية والتاريخ المرضي:-	بالغ	طفل
• ارتفاع في درجة الحرارة أو وجود تاريخ حديث لارتفاع في درجة الحرارة	2	1
• سعال (مستجد او متزايد)	2	1
• ضيق في التنفس (مستجد أو متزايد)	2	1
• غثيان وقيء و / أو إسهال	1	-
• فشل كلوي مزمن، قصور في وظائف القلب، او امراض نقص المناعة	1	-
مجموع التقييم النهائي		

*وفق ما أعلنته وزارة الداخلية أو وزارة الصحة ويتم تحديثه بانتظام على موقع: www.covid19.cdc.gov.sa

**المريض أو أحد افراد الأسرة

اذا كان مجموع التقييم النهائي ≥ 4 يطلب من المريض تطهير اليدين وارتداء الكمام الجراحي، ثم توجيه المريض من خلال المسار التنفسي وإبلاغ الطبيب للتقييم

يتم إجراء الاختبارات الخاصة بمتلازمة الشرق الأوسط التنفسية أو الكورونا المستجد فقط حسب تعريف الحالة المعتمد.

اسم موظف الفرز: ____________________ التوقيع: ____________________

THANK YOU