

# Hajj and Health

## Objectives

- Enlist the diseases and health risks related with gathering of Hajj
- Understand the signs and symptoms and prevention of these diseases
- Understand the importance of surveillance and reporting of these diseases at the national and International level
- Appreciate KSA's efforts to address and recognize the health risks and diseases during Hajj

We advice to study the lectures of the subtopics before studying this lecture (basically keep this for last)

## Color Index

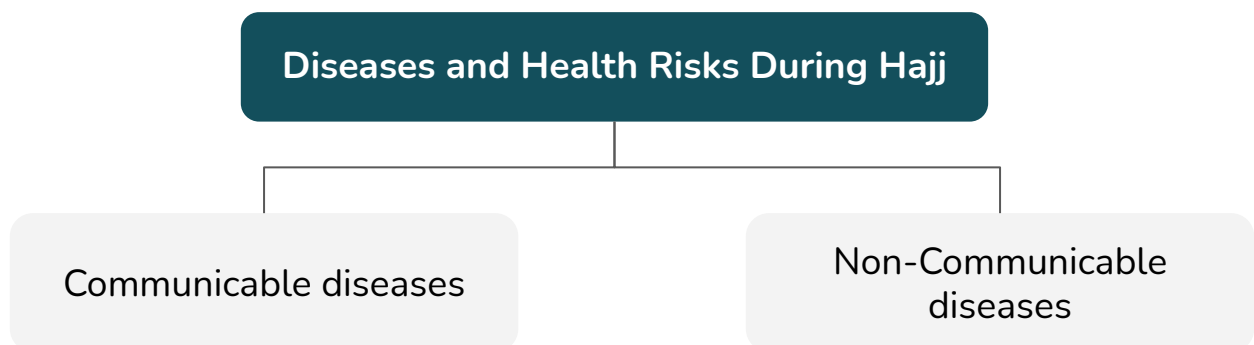
- Main text
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# Introduction

- The Hajj pilgrimage is one of the greatest **mass gatherings** in the world, and presents unique public health challenges.
- Mass gatherings can present important public health **challenges** related to the **health of attendees** and of the **host country population** and **health services**.
- Millions of Muslims from around the world gather annually to perform the Hajj pilgrimage in Mecca, in Saudi Arabia.
- Pilgrims performing the Hajj are predisposed to diverse and significant health risks, **due to:**
  - The limited time and confined geographical area of the event.
  - The large numbers of people, with population densities among the millions of participants, reaching 7 persons/m<sup>2</sup>.

## Health risks and hazards associated with mass gatherings

- **Transmission of communicable diseases, including antibiotic-resistant bacterial infections.**
- Water and sanitation related disorders.
- Non-communicable diseases and exacerbation of comorbidities (eg, diabetes, hypertension, COPD, and cardiovascular events).
- Mental health and psychosocial disorders.
- Thermal disorders, including heat hyperpyrexia, heat stroke, heat exhaustion, and dehydration.
- Stampedes. **التدافع والاندفاع**
- Accidents, trauma, and crush injuries.
- Terrorist incidents (biological and chemical warfare threats, explosives, and bombs).



# Communicable diseases

- **Unhygienic practices** and close contacts between pilgrims in **overcrowded situations** during the Hajj rituals, as well as **international travel**, increase the risks of outbreaks and the spread of infectious diseases among pilgrims.
- The risk of infectious diseases transmission may extend to the local Saudi population and to the home population of returning pilgrims after Hajj.
- This could strain the public health services in Saudi Arabia and may threaten global health security.

## Meningococcal disease

- Meningitis, or inflammation of the meninges, can be caused by several different bacterial pathogens. By far, the most important of these pathogens is **Neisseria meningitidis** because of its **potential to cause epidemics**.

### Epidemiology

- **Crowded conditions** are a risk factor for the carriage and transmission of Neisseria meningitidis.
- **Hajj has been associated with outbreaks of invasive meningococcal disease.** Most cause of epidemics
  - **Outbreaks have high fatality rates.**
  - **Associated with medical costs.**
  - Preventive measures are needed to control its transmission.
- During the **2000** and **2001** Hajj pilgrimages, Saudi Arabia experienced 2 large outbreaks of invasive meningococcal disease that led to global spread of N. meningitidis serogroup **W-135**  
This happened during hajj before that this strain wasn't known.

### Neisseria meningitidis

- Bean shaped, Gram negative, aerobic diplococci.
- Outer membrane of lipids, membrane proteins and lipopolysaccharides.
  - Pathogenic meningococci are enveloped by a **polysaccharide capsule** the capsule identifies the valurince
- Serogroups A, B and C account for most cases
  - A & C in Asia and Africa, while B & C in Europe and the Americas.
- **Humans are the only reservoir.**
- **Nasopharynx** is the natural habitat and reservoir, in most cases colonization of Nasopharynx is asymptomatic.
- However, blood stream invasion by N. meningitidis can lead to meningitis and septicaemia with serious consequences.
- Even with adequate chemotherapy, meningococcal meningitis has a **fatality rate of about 10%** and about 15% of the survivors have residual (CNS) damage **hearing loss, vision loss, and preeminent damage**

# Meningococcal disease

## Host

- **Maternal antibodies offer protection against invasive disease till the age of six months.**
- Susceptibility **peaks at age 6 - 12 months** and decreases again after colonization of closely related non-pathogenic bacteria.
- **Invasive disease occurs if no protective bactericidal antibodies are mounted against the infecting strain.**
- Those infected with the HIV are probably also at increased risk for sporadic meningococcal disease **due to low immunity**

## Environment

- Individuals acquire the infection if they are exposed to virulent bacteria and have no protective antibodies.
- **Crowded living conditions** also facilitate disease spread, since individuals from different areas have different strains of meningococci.
- The **risk of invasive disease** is higher in the first **few days after exposure to a new strain.**
- **Smokers**

## Mode of Transmission

- **Direct contact.**
- **Respiratory droplets:** coughing and sneezing can be transmitted to non immune hosts within a distance of one meter.
- The average **incubation period is 3 - 4 days** with a range of 2 to 10 days, this is also the period of communicability.
- The bacteria are rapidly eliminated from the nasopharynx after starting antibiotics, usually within 24 hours.
- Both cases and carriers serve as the source of infection.

## Diagnosis

- The diagnosis of meningococcal meningitis is suspected by the **clinical presentation** and a **lumbar puncture** showing a **purulent spinal fluid.**
- **Typical CSF abnormalities in meningitis include:**
  - **Increased pressure (>180 mm water)**
  - **WBC counts between 10 and 10,000 cells/ $\mu$ L, (predominantly neutrophils)**
  - **Decreased glucose concentration (<45 mg/dL)**
  - **Increased protein concentration (>45 mg/dL)**

# Meningococcal disease

## Clinical Features

### Most Common symptoms

- **Acute onset of intense headache**
- **High fever** can reach to 40
- Nausea & Vomiting
- **Sensitivity to light (photophobia)**
- **Stiff neck.**
- Can develop over several hours, or 1 - 2 days.
- **Meningococcal septicaemia:** which is characterized by a **haemorrhagic rash** which usually indicates disease progression and rapid circulatory collapse

### In infants and young children

- **Subacute infection that progresses over several days.**
- There is a slower onset of signs and symptoms
- Nonspecific symptoms and neck stiffness may be absent.
- Irritability and **projectile vomiting** may be the presenting features in this age group.
- **Seizures** occur in 40% of children with meningitis.
- Neck stiffness can be absent in children so a high fever in children meningitis unless proven otherwise

## Management

- It is potentially fatal and should always be viewed as **medical emergency.**
- It requires **early recognition** of the disease, prompt **initial parenteral antibiotic** therapy and close monitoring.
- Admission to a hospital centre is essential.
- Several antibiotics can be used for treatment including penicillin, ampicillin, chloramphenicol and ceftriaxone.

## Preventive measures for Meningococcal disease

Chemoprophylaxis

Use of vaccination

Health awareness and educational campaigns

Efficient disease surveillance and response systems

### 1- Chemoprophylaxis:

- Is the preferred means of prevention of disease among close contacts of sporadic cases.
- Antibiotics that can be used for chemoprophylaxis are:



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Ciprofloxacin( single oral dose of 500 mg), rifampicin (600 mg 12 hourly for 2 days), or ceftriaxone (250 mg IM single), minocycline, ofloxacin, and spiramycin.



- Rifampicin 10 mg/Kg 12 hourly for 2 days (5mg/Kg for infants).  
- Injection ceftriaxone 125 mg IM single dose.

Rifampicin is not given to pregnant women

# Meningococcal disease

## 2- Meningococcal Vaccines:

- More than 90% of meningococcal disease, **vaccines are available for group A, C, Y and W - 135**
- At present **two types** of meningococcal vaccines are licensed;
  - Meningococcal **polysaccharide vaccines**:
    - Bivalent → protection against serogroups A and C.
    - Quadrivalent → protection against serogroups A, C, Y and W - 135 **commonly used**
    - The dose for primary vaccination for both adults and children older than 2 years is a single 0.5 ml SC injection.
    - Protective levels of antibody are usually achieved within 7 - 10 days of vaccination
  - Meningococcal conjugated polysaccharide vaccine.
- **Recommendations for use of meningococcal vaccine:**



Vaccination with a single dose of polysaccharide vaccine is recommended for travelers above 18 months of age going to an area experiencing an epidemic of meningococcal disease or to areas with a high rate of endemic meningococcal disease.

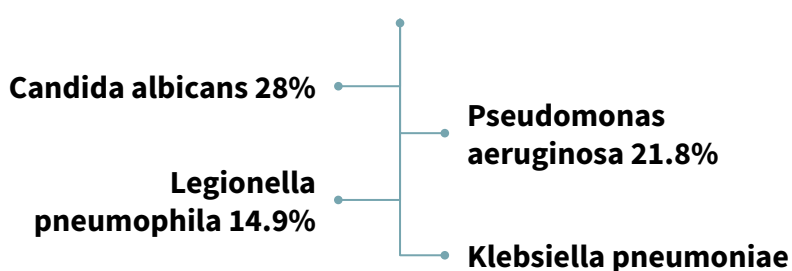
# Respiratory tract infection

- Respiratory diseases are the most common cause of outpatient department visits during the Hajj, accounting for 41–60.8% of visits
- Upper respiratory tract infections (URTIs), including **pharyngitis**, **viral URTI**, and **tonsillitis**
- Comorbidity is one of the risk factors for development of URTI.
  - In pilgrims who suffered from comorbidity, there was a significant association with longer duration of cough, longer duration of sore throat, and severe influenza-like illness requiring admission to hospital for further treatment.
- Acute respiratory infections were caused by:
  - Influenza virus (IV).
  - Respiratory syncytial virus (RSV).
  - Less commonly, parainfluenza virus, rhinovirus, adenovirus and enterovirus.

## Pneumonia

- 94% of whom were aged > 50 years
- One of the leading causes of **hospitalization** of pilgrims in Mecca, especially among elderly people
- The leading cause of severe **sepsis** and **septic shock** among pilgrims admitted to the ICU.

### Pathogens



## Tuberculosis

- The annual risk is **3 times higher** in Mecca than the national average in Saudi Arabia.
- > 50% of pilgrims come from TB-endemic countries.
- TB infection rate was 10% among Hajj pilgrims.
- TB during the Hajj has the potential to be a source of TB upon return of pilgrims to their home countries

# Communicable diseases

## Preventive Measures

- Some preventive measures are associated with **reduced risk of respiratory illness**, such as:



## Diarrhoeal diseases

- Around 9.3% of pilgrims experienced diarrhoeal symptoms during the Hajj period.
- **Cholera (especially from Yemen)** and **traveller's diarrhoea** are common during the Hajj.
- The last case of Cholera reported was in 1989. Since then, no outbreak has been reported despite the fact that outbreaks occurred in countries from where pilgrims came.



# Communicable diseases

## Emerging infectious diseases separate lecture

- Emerging infectious diseases are of special concern in Hajj health care.
- In 2009, IAV H1N1 presented a potentially massive threat to Hajj pilgrims, mainly because Saudi Arabia ranked fourth in probable swine flu cases and deaths in the Eastern Mediterranean Region. Moreover, a large number of pilgrims were from resource-limited countries; therefore, only a minority of pilgrims was likely to have had access to IAV H1N1 vaccine before they travelled to Saudi Arabia for the Hajj.

| Key considerations related to communicable disease alert, response, and operation plans for mass gatherings |   |
|---|---|
| <b>Risk assessment and management</b>   | - Surveillance and alert systems, and outbreak alert and response twinned to effective communication strategies.  |
| <b>Rapid Identification</b>   | - Of attendees with communicable diseases and their contacts for potential quarantining and instituting preventive infection control measures.  |
| <b>Medical care planning</b>  | - and guidelines (preventive medicine, mandatory vaccinations, food management, water and waste management, and identification of physical and fire hazards).   |
| <b>Public health measures</b>   | - - -   |
| <b>Emergency planning and response</b>  | - Rapid access to injured or ill patients, provision of triage in the field and at aid stations, provision of on-site care for minor injuries and illnesses, effective and timely stabilisation and transport of patients requiring evacuation. |
| <b>Disaster medicine</b>  | - Trauma, and triage and level of care.   |
| <b>Mobile units</b>   | - Health stations, and designated hospitals.  |
| <b>Proactive surveillance</b>   | - Use of modern technologies for proactive surveillance, early diagnosis and rapid detection, data collection, analyses, sharing, and communication.  |
| <b>Updating Travel guidelines</b>   | - Including vaccinations, for each specific mass gathering event  |

# Non-Communicable diseases

separate lecture

## Pre-existing chronic illness

- Pilgrims with pre-existing cardiac diseases are at high risk of physical stress that leads to ischemia.
- **Cardiovascular diseases:**
  - **The most common cause of death during the Hajj**, accounting for 66% of all deaths.
  - Accounted for 63.6% of ICU admissions, and was the second most common cause for admission to hospital.
  - These high rates may have been due to the high number of elderly people with chronic diseases among the pilgrims.
  - Pre-Hajj functional assessment should be carried out to identify patients at a high risk of mortality from cardiovascular diseases.

## Trauma

- The **mass movement** of millions of pilgrims from one ritual place to another, in a short time and in a small area, significantly increases the risk of trauma.
- **Numerous accidents and injuries face Hajj pilgrims, such as:**
  - Falling, Sliding, Stampede, Traffic accidents.
- Most of the traumas usually occur during the rituals of Tawaf, Saee and Ramy al- jamarat.
- Trauma accounted for 9.4% of hospital admissions and 6.4% of ICU admissions.
- The rate of all-cause fractures was high, perhaps because of increased overcrowding.

## Heat injury

- Heat stress is one of the main complaints among Hajj pilgrims, **due to:**
  - **High air temperatures, sun exposure, and heat wasted** from the large number of people and vehicles.
  - Highest incidence of **heat fatalities** occurred when the maximum air temperature reached **48.7°C**.
- In recent years, the incidence of heat stroke and exhaustion has been **low, probably due to improvement in climatic conditions since the Hajj seasons have been occurring in the winter.**

### Minimize heat exposure by

- **Awareness** of the signs and symptoms of heat stress.
- Avoiding excessive sun exposure by using **umbrellas** and seeking **shade**, use of **sun block creams**, and **drinking** adequate fluid.

### Preventative measures

- By saudi authority:
- Making drinking water available for all pilgrims
  - Providing water mist sprayers that operate regularly in the places where the Hajj rituals are performed

# Surveillance and Reporting

separate lecture

## Surveillance Systems during Hajj

- Infectious diseases surveillance systems are operational during the annual Hajj.
- Evolved from paper-based reporting tools to automated electronic systems, recording and storing large datasets.
- Reporting from mobile units, clinics, primary health facilities, and hospitals that serve pilgrims.
- All these data are fed directly to a central command and control unit, enabling rapid incorporation and analyses of data and necessary public health interventions.
- These advances in real-time surveillance have improved public health security for the mass gatherings at the Hajj.

## Infectious Diseases Surveillance Tools

### 1 HESN

- Web-based electronic solution, introduced by the Saudi MoH to improve **communication** among public health professionals involved in outbreak management.
- Also it use to provide quality health data for planning and effective allocation of resources.
- It was initially implemented as a pilot in Makkah region of Saudi Arabia in 2012.
- By January 2014, a country-wide implementation was initiated to control the outbreak of MERS-CoV in the Kingdom.

### 2 CITREX

- Is a electronic statistical system for Hajj.
- It is a web-based electronic solution.
- **CITREX is used only during Hajj** to manage infectious diseases data captured in real time from the health facilities in the Holy areas (Makkah, Medina, Arafat and Mina).
- Although the hospital surveillance teams handled data entry into HESN, the fixed surveillance teams captured the same health data into CITREX for analysis and notification on distinct electronic dashboards at the CCC.

# KSA's Efforts for a Healthy Hajj

## KSA's Healthcare System during Hajj

- The Saudi Ministry of Health takes the Hajj season seriously.
- It starts to plan for the next season immediately after finishing the current season by gathering feedback from local and international health agencies.
- The Saudi government provides **free healthcare services** for all pilgrims.
- The **healthcare system**, which is operated by 26 421 domestic employees in addition to international visiting healthcare practitioners, provides **curative** and **preventive services**.

1

### Preventive services

- Infectious disease surveillance
- Outbreak investigations
- Mass vaccinations
- Mass administration of prophylactic medications
- Environmental health services, and
- Health education

2

### Health education activities

- Awareness campaigns
- Distribution of booklets to arriving pilgrims.
- Establishing toll-free telephone lines operated by trained healthcare providers.

## Travel immunisation recommendations

- Every year the Saudi Arabian Ministry of Health issues updates on travel immunisation recommendations for pilgrims.
- They are classified as:
  - **Mandatory** (required)
  - **Voluntary** (recommended) before performing Hajj
- The three **mandatory** vaccines are:
  - quadrivalent meningococcal vaccine for all pilgrims
  - Yellow fever
  - Polio vaccines for pilgrims coming from countries with active polio transmission.
- **Recommended** vaccines include:
  - influenza vaccine
  - pneumococcal vaccine

# Quiz

## MCQ

1-Which of the following is a recommended vaccine?

A- Yellow fever vaccine B- Quadrivalent meningococcal vaccine C- influenza vaccine D- Polio vaccines

2-In meningococcal disease, Maternal antibodies offer protection against invasive disease till the age of?

A. 9 months B. 12 months C. 24 months D. 6 months

3-In an infant the susceptibility to get an invasive meningococcal disease peaks at age?

A- 6-12 months B. 12-24 months C. 1-3 months D. 3-6 months

4- Which of the following has the potential for epidemic spread?

A. Tuberculosis B. Meningococcal disease C. Pneumonia D. Cholera

5- The KSA's Health education activities during Hajj include all of the following except:

A-awareness campaigns

B.distribution of booklets to arriving pilgrims

C.mass administration of prophylactic medications

D.establishing toll-free telephone lines operated by trained healthcare providers

6- Pre-Hajj functional assessment should be carried out to identify patients at a high risk of mortality especially from:

A- Cardiovascular diseases B.Gastrointestinal diseases C.Endocrine diseases D.Liver diseases

## Answers

| Q1 | Q2 | Q3 | Q4 | Q5 | Q6 |
|----|----|----|----|----|----|
| C  | D  | A  | B  | C  | A  |

Thank You and  
Good Luck



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