

Hajj and Health



Dr. Shatha Alduraywish, MBBS; MEpi; PhD;TTS

Assistant Professor, Epidemiologist

Department of Family and Community Medicine

College of Medicine - King Saud University

Email: salduraywish@ksu.edu.sa

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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

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, and
 - the large numbers of people, with population densities among the millions of participants, reaching 7 persons/m²

Introduction

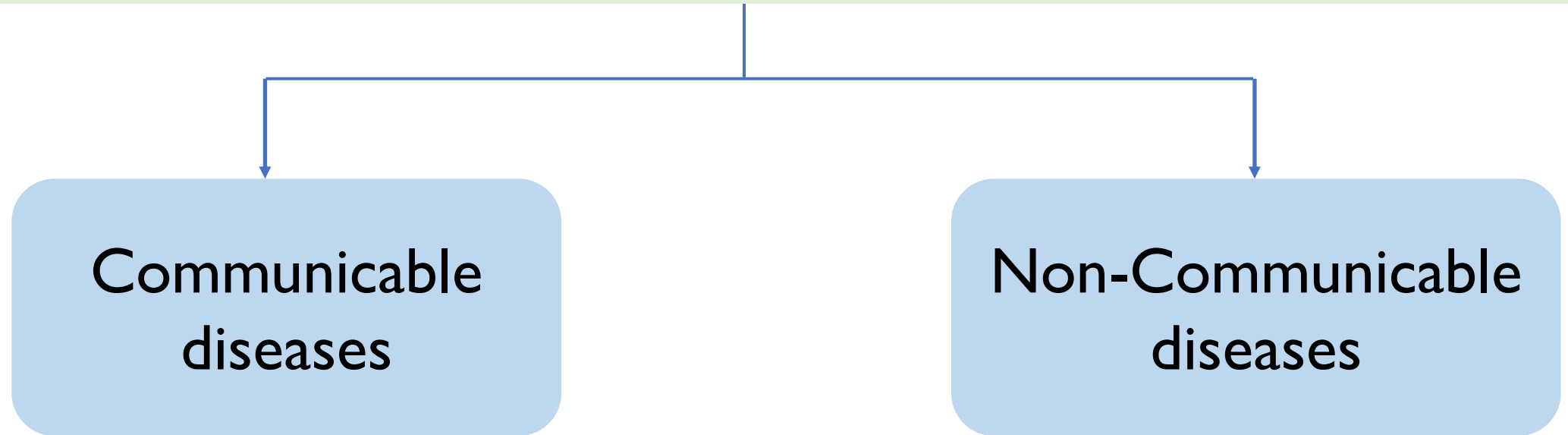
Health risks and hazards associated with mass gatherings

- 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
- Accidents, trauma, and crush injuries
- Terrorist incidents (biological and chemical warfare threats, explosives, and bombs)

The diseases and health risks related with gathering of Hajj



Diseases and Health Risks During Hajj



Communicable diseases

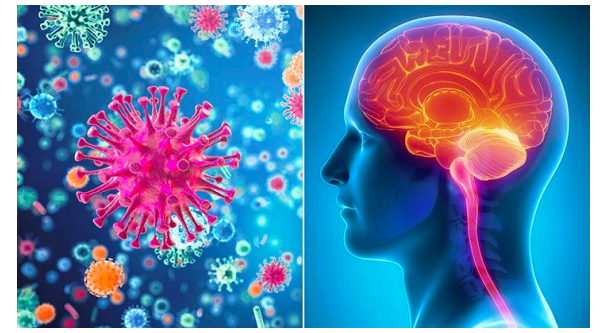


Communicable Disease



- 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



- Meningococcal disease is a serious public health threat given the seriousness of the illness, its disabling sequelae and its potential for epidemic spread.
- The disease is a concern during mass gatherings which provide **conditions that facilitate transmission of infectious agents** including *Neisseria meningitidis*.
- Crowded conditions are a risk factor for the carriage and transmission of ***Neisseria meningitidis***
- Hajj has been associated with **outbreaks of invasive** meningococcal disease
- 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**
- Meningococcal disease outbreaks have **high fatality rates** and associated **medical costs**
 - Preventive measures are needed to control its transmission

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
- The mucosal surfaces of the human **nasopharynx** being its natural habitat and reservoir
- In most cases colonization of the human 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 Central Nervous System (CNS) damage

Meningococcal disease



- Worldwide serogroups A, B and C account for most cases of meningococcal disease.
- The predominant serogroups in Asia and Africa are A and C while serogroups B and C are responsible for the majority of cases in Europe and the Americas.
- Recent outbreaks among Hajj pilgrims have been attributed to serogroup W135

Meningococcal disease



Causative Agent

- Neisseria meningitidis are **bean shaped**
- Gram negative, aerobic diplococci.
- The bacteria are surrounded by an outer membrane of lipids, membrane proteins and lipopolysaccharides.
- Pathogenic meningococci are enveloped by a **polysaccharide capsule**



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 Human Immunodeficiency Virus are probably also at increased risk for sporadic meningococcal disease



Meningococcal disease



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**



Meningococcal disease

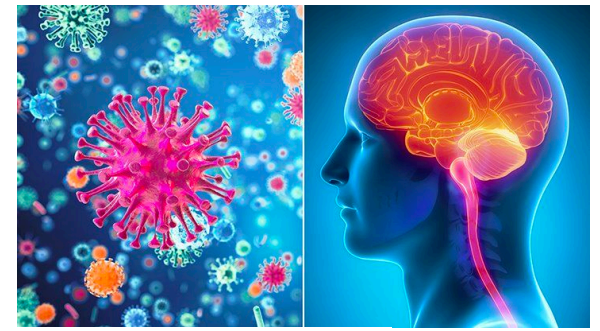


Transmission

- The main modes of transmission are **direct contact** and **respiratory droplets**.
- Respiratory droplets produced by 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.
- Humans are the only reservoir.
- Both **cases and carriers** serve as the source of infection.



Meningococcal disease



Clinical Features

■ The most common symptoms are

- acute onset of intense headache
 - high fever
 - Nausea
 - Vomiting
 - sensitivity to light (photophobia)
 - stiff neck.
-
- These symptoms can develop over **several hours**, or they may take **1 - 2 days**.
 - A more severe form of meningococcal disease is meningococcal septicaemia which is characterized by a **haemorrhagic rash** which usually indicates disease progression and rapid circulatory collapse

MENINGITIS SYMPTOMS



Meningococcal disease

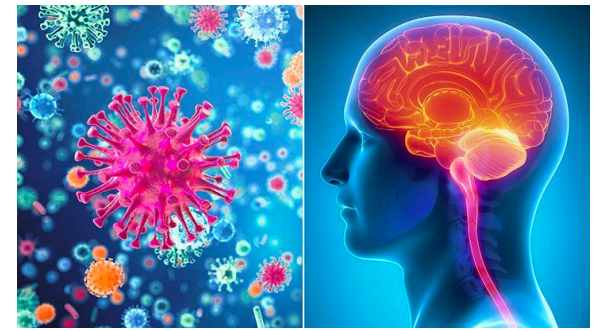


Clinical Features In Infants and young children

- bacterial meningitis usually presents as a **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.



Meningococcal disease



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/ μL , (predominantly neutrophils),
 - Decreased glucose concentration (<45 mg/dL) and
 - Increased protein concentration (>45 mg/dL)

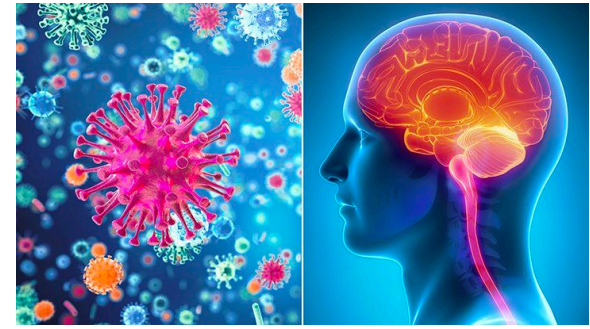
Meningococcal disease



Management

- Meningococcal disease is potentially **fatal** and should always be viewed as **medical emergency**.
- Management of meningococcal disease 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

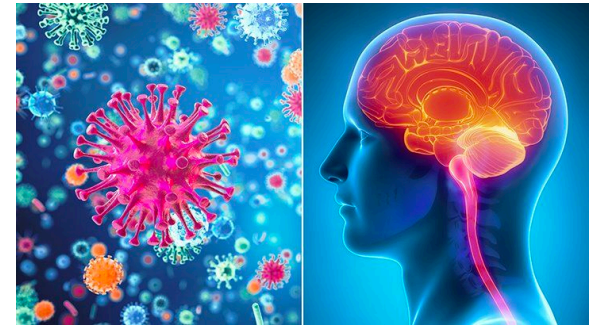
Meningococcal disease



Preventive measures for Meningococcal disease

- Chemoprophylaxis
- Use of vaccination
- Health awareness and educational campaigns,
- Efficient disease surveillance and response systems

Meningococcal disease

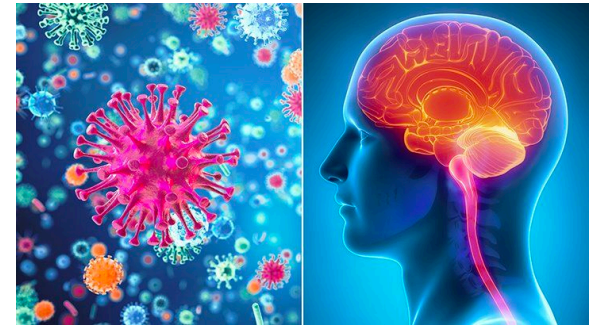


Preventive measures for Meningococcal disease

Chemoprophylaxis

- Chemoprophylaxis is the preferred means of prevention of disease among **close contacts** of sporadic cases
- Antibiotics that can be used for chemoprophylaxis are rifampin, ciprofloxacin, ceftriaxone, minocycline, ofloxacin, and spiramycin.
- **Ciprofloxacin** single oral dose of 500 mg, **rifampicin** 600 mg 12 hourly for two days, or **ceftriaxone** 250 mg IM single dose are the options for adults
- The choices for children include **rifampicin** 10 mg/Kg 12 hourly for two days (5mg/Kg for infants) or injection **ceftriaxone** 125 mg IM single dose.

Meningococcal disease

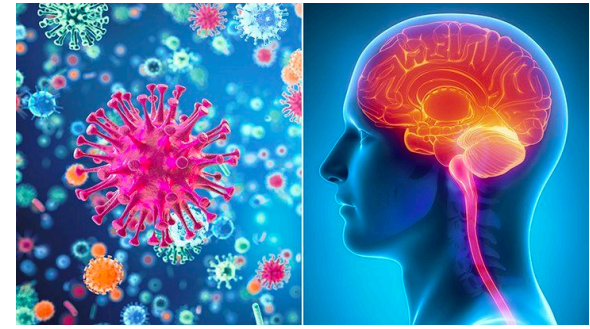


Preventive measures for Meningococcal disease

Meningococcal Vaccines

- Of the five common serotypes responsible for 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 and quadrivalent) and meningococcal **conjugated polysaccharide vaccine**.

Meningococcal disease

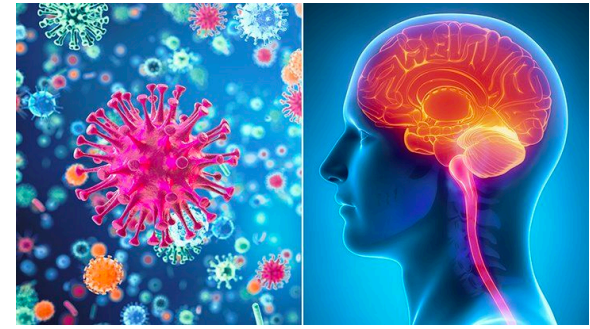


Meningococcal Vaccines

Polysaccharide Vaccines :

- Bivalent polysaccharide vaccines provide protection against serogroups A and C,
- Quadrivalent polysaccharide vaccines provide protection against serogroups A, C, Y and W - 135.
- The dose for primary vaccination for both adults and children older than two years is a single **0.5 - ml subcutaneous** injection.
- Protective levels of antibody are usually achieved within **7 - 10 days** of vaccination

Meningococcal disease



Meningococcal Vaccines

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)** or **respiratory syncytial virus (RSV)**. Less commonly, parainfluenza virus, rhinovirus, adenovirus and enterovirus

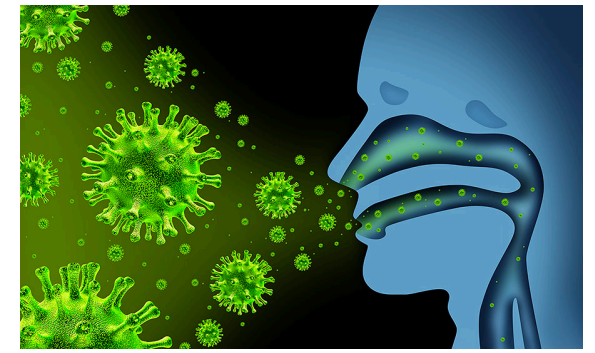
Respiratory tract infection



Pneumonia

- 94% of whom were aged > 50 years
- Pneumonia is one of the leading causes of **hospitalization** of pilgrims in Mecca, especially among elderly people
- Pneumonia was also the leading cause of **severe sepsis** and **septic shock** among pilgrims admitted to the ICU
- **Candida albicans** being the most frequent pathogen (28.7%), followed by **Pseudomonas aeruginosa** (21.8%), **Legionella pneumophila** (14.9%) and **Klebsiella pneumoniae**

Respiratory tract infection



Tuberculosis (TB)

- The annual risk of tuberculosis (TB) 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

Respiratory tract infection



Preventive Measures

- Some preventive measures are associated with **reduced risk of respiratory illness**, such as
 - practicing social distancing
 - hand hygiene
 - contact avoidance, and
 - washing the throat and mouth with salt water
- More Preventive Measures recommended by the Saudi Ministry of Health to decrease the risk of respiratory infections
 - the use of facemasks
 - administration of the seasonal influenza vaccine

Diarrhoeal diseases



- Around 9.3% of pilgrims experienced diarrhoeal symptoms during the Hajj period
- Cholera 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

Emerging infectious diseases



- 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

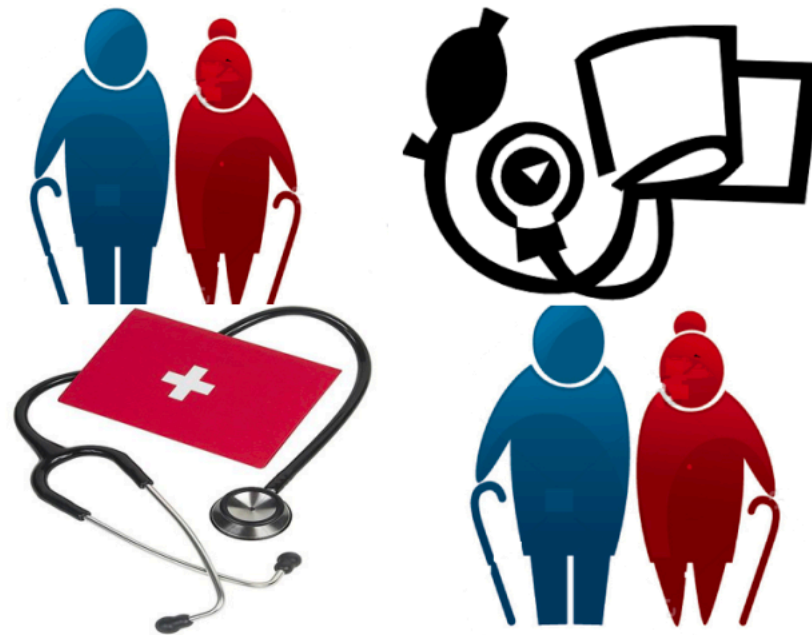
Key considerations related to communicable disease alert, response, and operation plans for mass gatherings

- **Risk assessment and management**, surveillance and alert systems, and outbreak alert and response twinned to **effective communication** strategies
- Rapid **identification** of attendees with communicable diseases and their contacts for potential quarantining and instituting preventive infection control measures
- **Medical care planning** and guidelines (preventive medicine, mandatory vaccinations, food management, water and waste management, and identification of physical and fire hazards)
- Public health measures

Key considerations related to communicable disease alert, response, and operation plans for mass gatherings, Cont.

- **Emergency planning and response** (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)
- **Disaster medicine**, trauma, and triage and level of care
- **Mobile units**, health stations, and designated hospitals
- Use of modern technologies for **proactive surveillance**, early diagnosis and rapid detection, data collection, analyses, sharing, and communication.
- Updating **travel guidelines**, including vaccinations, for each specific mass gathering event

Non-Communicable diseases



Pre-existing chronic illness



- Pilgrims with **pre-existing cardiac diseases** are at high risk of **physical stress** that leads to ischemia.
 - **Cardiovascular diseases** are the most common cause of **death** during the Hajj, accounting for 66% of all deaths
 - Cardiovascular disease 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,** and **traffic accidents**
- Most of the traumas usually occur during the rituals of Tawaf, Sae 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
- The high air **temperatures**, **sun exposure**, and **heat wasted** from the large number of people and vehicles all contribute to the problem of heat stress
- The 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

Heat injury



- Minimize heat exposure by
 - developing **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 established by the Saudi authorities:
 - making drinking **water available** for all pilgrims, and
 - providing **water mist** sprayers that operate regularly in the places where the Hajj rituals are performed

Surveillance and Reporting

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.

Surveillance Systems during Hajj

Infectious Diseases Surveillance Tools during Hajj

Electronic Surveillance Systems (HESN, CITREX)

- **HESN** is a 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.
- HESN 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

Surveillance Systems during Hajj

- **CITREX** is an electronic statistical system for Hajj
- It is a web-based electronic solution
- Unlike HESN which is implemented country-wide, 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

KSA's Healthcare System during Hajj

- 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**.
- The preventive services include
 - infectious disease surveillance
 - outbreak investigations
 - mass vaccinations
 - mass administration of prophylactic medications
 - environmental health services, and
 - health education

KSA's Healthcare System during Hajj

- Health education activities include
 - awareness campaigns,
 - distribution of booklets to arriving pilgrims, and
 - establishing toll-free telephone lines operated by trained healthcare providers.

KSA's Healthcare System during Hajj

- 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



THANK YOU

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