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To: All North Carolina Health Care Providers
From: Emma Doran, MD, MPH, Medical Epidemiologist
Subject: **Middle-East Respiratory Syndrome Coronavirus (MERS-CoV)** *(4 pages)*
Date: May 29, 2024

Summary
Middle East Respiratory Syndrome (MERS) is an illness caused by a coronavirus (MERS-CoV) that was first identified in 2012 and has been associated with severe respiratory infections among persons who live in or have traveled to the Middle East and persons (including health care providers) exposed to MERS cases outside of the Middle East. The first travel-associated cases in the United States were confirmed in May 2014. There has been clear evidence of person-to-person transmission both in household and healthcare settings, but no evidence of sustained person-to-person transmission in the community.

Healthcare providers should maintain an increased suspicion for MERS-CoV in anyone presenting with respiratory symptoms after recent travel to countries in and near the Arabian Peninsula including travel to the Kingdom of Saudi Arabia (KSA) for Hajj, an annual Islamic pilgrimage.

Case Investigation
A person meeting both the clinical features and epidemiological criteria listed below should be considered a Patient Under Investigation (PUI).

Clinical Criteria		Epidemiologic Criteria
Severe illness Patient has fever and pneumonia OR fever and acute respiratory distress syndrome with no other more likely alternative diagnosis	**and** ≥1 of the following epidemiologic risk factors	Within 14 days before symptom onset, a history of travel from countries in or near the Arabian Peninsula[1] -or- Within 14 days before symptom onset, history of close contact with a person who themselves developed fever and acute respiratory illness within 14 days of residing in or travel to countries in or near the Arabian Peninsula -or- Within 14 days before symptom onset, a history of direct physical contact with camels[2] in North, West, or East Africa[3] -or- Is a member of a cluster of patients with severe acute respiratory illness of unknown etiology -or- High risk occupational exposure to MERS-CoV, such as laboratory or research personnel[4]

Clinical Criteria		Epidemiologic Criteria
Milder illness Patient has fever or symptoms of respiratory illness (e.g., cough and/or shortness of breath) with no other more likely alternative diagnosis	**and** ≥1 of the following epidemiologic risk factors	Within 14 days of symptom onset, a history of being in a health care facility (as a patient, worker, or visitor) in a country or territory in or near the Arabian Peninsula where recent health care–associated cases of MERS have been identified -or- Within 14 days of symptom onset, a history of direct physical camel contact[2] in or near the Arabian Peninsula -or- Within 14 days of symptom onset, a history of close contact[5] with a person with confirmed MERS-CoV infection while that person was ill -or- High risk occupational exposure to MERS-CoV, such as laboratory or research personnel[4]

[1]Countries considered in or near the Arabian Peninsula include: Bahrain; Iraq; Iran; Israel, the West Bank and Gaza; Jordan; Kuwait; Lebanon; Oman; Qatar; Saudi Arabia; Syria; the United Arab Emirates (UAE); and Yemen.
[2]Direct physical contact could include touching, riding, hugging, kissing, grooming, or exposure to respiratory secretions but does not include consumption of cooked camel meat.
[3]Because the risk for MERS-CoV transmission from camels in North, West, and East Africa is not yet fully understood, consider MERS evaluation for travelers coming from these regions who develop severe respiratory illness within 14 days of direct physical camel contact.
[4]Diagnostic and research facilities that handle MERS-CoV should have established procedures instructing their staff in how to prevent and respond to occupational exposures. Laboratory exposure can occur through contact with infected animals and viral specimens without proper precautions and personal protective equipment (PPE).
[5]Close contact is defined as a) being within approximately 6 feet (2 meters), or within the room or care area, of a confirmed MERS patient for a prolonged period of time (such as caring for, living with, visiting, or sharing a healthcare waiting area or room with, a confirmed MERS patient) while not wearing recommended personal protective equipment or PPE (e.g., gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection); or b) having direct contact with infectious secretions of a confirmed MERS patient (e.g., being coughed on) while not wearing recommended personal protective equipment.

Clinicians caring for patients meeting these criteria should immediately contact their local health department or the state Communicable Disease Branch (919-733-3419; available 24/7) to discuss laboratory testing and control measures.

Persons who meet criteria should also be evaluated for common causes of community-acquired pneumonia, if not already done. *(Note: Viral culture should not be attempted in cases with a high index of suspicion.)* MERS-CoV infection should still be considered even if another pathogen is identified, since co-infections have been reported.

Any cluster of severe acute respiratory illness in healthcare workers in the United States should be thoroughly investigated. The occurrence of a severe acute respiratory illness cluster of unknown etiology should prompt immediate notification of local public health for further investigation and testing.

Specimen Collection and Testing
Specimens obtained from individuals meeting the current definition of a PUI for MERS-CoV should be submitted to the NCSLPH for diagnostic testing using a real-time reverse-transcription polymerase chain reaction (rRT-PCR assay) at the CDC. Acceptable specimen types include:

- Lower respiratory tract specimens **preferred** (bronchoalveolar lavage, sputum and tracheal aspirates)
- Upper respiratory tract (nasopharyngeal (NP) and oropharyngeal (OP) swabs) After collection, NP and OP swabs can be combined in the same vial of 2-3 ml viral transport media)

CDC recommends the collection of two respiratory specimen types, with at least one being a lower respiratory tract specimen, as soon as possible after symptom onset and within 7 days of onset. However, if patients remain symptomatic for > 7 days, respiratory specimens should still be collected, with a preference for lower respiratory tract specimens. NP/OP specimens, in addition to a lower respiratory tract specimen is strongly recommended depending upon the length of time between symptom onset and specimen collection. All specimen containers must be labeled with two primary patient identifiers (e.g. full name and DOB), specimen type, and the date of collection.

Specimen storage:

- 2-8°C for up to 72 hours after collection.
- If extraction cannot be completed within 72 hours, specimens should be stored at -70°C or lower as soon as possible after collection.

Specimen packaging and shipping: Specimens should be packaged and transported using Category B guidelines to the NCSLPH for submission to the CDC. Specimens less than 72 hours old can be received at 2-8°C. Specimens > 72 hours old must be received frozen on dry ice at -70°C or lower. All specimens must be submitted with a completed CDC Form 50.34 and a completed MERS PUI Short Form.

Contact the BTEP unit (919-807-8600) to schedule expedited specimen transport to the NCSLPH or if you have submission questions.

See CDC's Collecting, Handling, and Testing Clinical Specimens from PUIs for MERS-CoV Infection guidance and Biosafety Guidelines for Handling and Processing Specimens Associated with MERS-CoV.

Infection Control

Transmission of MERS-CoV has been documented in healthcare settings. See CDC's updated Interim Guidance for Healthcare Professionals at https://www.cdc.gov/coronavirus/mers/infection-prevention-control.html

Standard, contact, and airborne precautions are recommended for management of patients in healthcare settings with known or suspected MERS-CoV infection. These include:

- Use of fit-tested NIOSH-approved N95 or higher respirators
- Use of gowns, gloves and eye protection
- Use of negative-pressure airborne infection isolation rooms (AIIR) if available

A facemask should be placed on the patient if an AIIR is not available or if the patient must be moved from his/her room.

Treatment

No antivirals are currently available for treatment of MERS-CoV. Individuals with MERS often receive medical care to help relieve symptoms. For severe cases, current treatment includes care to support vital organ functions.

Reporting
MERS-CoV infections are reportable in North Carolina. Physicians are required to contact their local health department or the state Communicable Disease Branch (919-733-3419) as soon as MERS-CoV infection is reasonably suspected.

Additional Resources
CDC MERS
CDC MERS Information for Healthcare Professionals

This is an official

CDC HEALTH ADVISORY

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Meningococcal Disease Cases Linked to Travel to the Kingdom of Saudi Arabia (KSA): Ensure Pilgrims are Current on Meningococcal Vaccination

Summary
The Centers for Disease Control and Prevention (CDC) is issuing this Health Alert Network (HAN) Health Advisory to alert healthcare providers to cases of meningococcal disease linked to Umrah travel to the Kingdom of Saudi Arabia (KSA). Umrah is an Islamic pilgrimage to Mecca, Kingdom of Saudi Arabia, that can be performed any time in the year; the Hajj is an annual Islamic pilgrimage this year taking place June 14–19, 2024. Since April 2024, 12 cases of meningococcal disease linked to KSA travel for Umrah have been reported to national public health agencies in the United States (5 cases), France (4 cases), and the United Kingdom (3 cases). Two cases were in children aged ≤18 years, four cases were in adults aged 18–44 years, four cases were in adults aged 45–64 years, and two cases were in adults aged 65 years or older. Ten cases were in patients who traveled to KSA, and two were in patients who had close contact with travelers to KSA. Ten cases were caused by *Neisseria meningitidis* serogroup W (NmW), one U.S. case was caused by serogroup C (NmC), and the serogroup is unknown for one U.S. case. Of nine patients with known vaccination status, all were unvaccinated. The isolates from the one U.S. NmC case and two NmW cases (one U.S., one France) were resistant to ciprofloxacin; based on whole-genome sequencing, the remaining eight NmW isolates were all sensitive to penicillin and ciprofloxacin.

In the United States, quadrivalent meningococcal (MenACWY) conjugate vaccination is routinely recommended for adolescents, and also recommended for travelers to countries where meningococcal disease is hyperendemic or epidemic, including a booster dose of MenACWY if the last dose was administered 3–5 or more years previously (depending on the age at most recent dose received). In addition, all Hajj and Umrah pilgrims aged one year and older are required by KSA to receive quadrivalent meningococcal vaccine. Healthcare providers should work with their patients considering travel to perform Hajj or Umrah to ensure that those aged one year or older have received a MenACWY conjugate vaccine within the last 5 years administered at least 10 days prior to arrival in KSA. Healthcare providers should also maintain increased suspicion for meningococcal disease in anyone presenting with symptoms of meningococcal disease after recent travel to KSA for Hajj or Umrah pilgrimage. U.S. health departments and healthcare providers should preferentially consider using rifampin, ceftriaxone, or azithromycin instead of ciprofloxacin for chemoprophylaxis of close contacts of meningococcal disease cases associated with travel to KSA.

Background
Meningococcal disease, caused by the bacterium *Neisseria meningitidis*, is a rare but severe illness with a case-fatality rate of 10–15%, even with appropriate antibiotic treatment. Meningococcal disease often presents as meningitis with symptoms that may include fever, headache, stiff neck, nausea, vomiting, photophobia, or altered mental status. Meningococcal disease may also present as a meningococcal bloodstream infection with symptoms that may include fever, chills, fatigue, vomiting, cold hands and feet, severe aches and pains, rapid breathing, diarrhea, or, in later stages, a petechial or dark purple rash (purpura fulminans). While initial symptoms of meningococcal disease can at first be nonspecific, they worsen rapidly and can become life-threatening within hours. Survivors may experience long-term effects such as deafness or amputations of the extremities. **Immediate antibiotic treatment for meningococcal disease is critical.** Blood and cerebrospinal fluid (CSF) cultures are indicated for patients with suspected

meningococcal disease. Healthcare providers should not wait for diagnostic testing or receipt of laboratory results before initiating treatment for suspected cases of meningococcal disease.

Meningococcal disease outbreaks have occurred previously in conjunction with mass gatherings including the Hajj pilgrimage. The most recent global outbreak of meningococcal disease associated with travel to KSA for Hajj was in 2000–2001 and was primarily caused by NmW. Since 2002, KSA has required that all travelers aged one year or older performing Hajj or Umrah provide documentation of either a) a MenACWY polysaccharide vaccine (MPSV4 is no longer available in the United States) within the last 3 years administered at least 10 days prior to arrival or b) a MenACWY conjugate vaccine within the last 5 years administered at least 10 days prior to arrival. This requirement aligns with ACIP recommendations for revaccination of U.S. travelers to endemic areas who received their last dose 3–5 or more years previously (depending on the age at most recent dose received). Nevertheless, meningococcal vaccination coverage among Umrah travelers is known to be incomplete.

Close contacts of people with meningococcal disease should receive antibiotic chemoprophylaxis as soon as possible after exposure, regardless of immunization status, ideally less than 24 hours after the index patient is identified. Ciprofloxacin, rifampin, and ceftriaxone are the first-line antibiotics recommended for use as chemoprophylaxis. However, ciprofloxacin-resistant strains of *N. meningitidis* have been emerging in the United States and globally. CDC recently released implementation guidance for the preferential use of other recommended prophylaxis antibiotics in areas with multiple cases caused by ciprofloxacin-resistant strains. Health departments should discontinue using ciprofloxacin as prophylaxis for close contacts when, in a catchment area during a rolling 12-month period, both a) ≥2 invasive meningococcal disease cases caused by ciprofloxacin-resistant strains have been reported, and b) cases caused by ciprofloxacin-resistant strains account for ≥20% of all reported invasive meningococcal disease cases. Though a catchment area is defined as a "single contiguous area that contains all counties reporting ciprofloxacin-resistant cases," in this circumstance, it is more appropriate to determine the catchment population based on travel history rather than geographic location at the time of diagnosis. Among the 11 global cases associated with travel to KSA that have antimicrobial sensitivity results available, 3 cases (27%) were caused by ciprofloxacin-resistant strains. Rifampin, ceftriaxone, or azithromycin should be preferentially considered instead of ciprofloxacin as prophylaxis for close contacts in the United States of meningococcal disease cases associated with travel to KSA.

Recommendations for Healthcare Providers

- Recommend vaccination with MenACWY conjugate vaccine for people considering travel to KSA to perform Hajj or Umrah (pilgrims) in addition to routine meningococcal vaccination for adolescents and other people at increased meningococcal disease risk.
- Maintain a heightened index of suspicion for meningococcal disease among symptomatic people who have recently been in KSA and among close contacts of people who have recently been in KSA, regardless of vaccination status.
- Immediately notify state, tribal, local, or territorial health departments about any suspected or confirmed cases of meningococcal disease in the United States.
- Preferentially consider using rifampin, ceftriaxone, or azithromycin instead of ciprofloxacin as prophylaxis for close contacts in the United States of meningococcal disease cases associated with travel in KSA.

Recommendations for Health Departments

- Preferentially consider using rifampin, ceftriaxone, or azithromycin instead of ciprofloxacin as prophylaxis for close contacts in the United States of meningococcal disease cases associated with travel in KSA.
- Consider outreach to local communities to promote meningococcal vaccination for Hajj and Umrah pilgrims to KSA.
- Collect a detailed travel history for all reported cases of meningococcal disease.
- Continue to report cases of meningococcal disease in people who have recently been in KSA, or in close contacts of people who have recently been in KSA, to CDC at meningnet@cdc.gov in

addition to routine reporting through the National Notifiable Diseases Surveillance System (NNDSS).

Recommendations for the Public

- People considering travel to KSA to perform Hajj or Umrah should ensure they are current on vaccination with MenACWY vaccine as required by KSA. All travelers aged one year or older performing Hajj or Umrah should have received either a) a MenACWY polysaccharide vaccine (MPSV4, no longer available in the United States) within the last 3 years administered at least 10 days prior to arrival or b) a quadrivalent MenACWY conjugate vaccine within the last 5 years administered at least 10 days prior to arrival.
- Immediately seek medical attention if you, your child, or another close contact develops symptoms of meningococcal disease:
    - **Symptoms of meningococcal meningitis** may include fever, headache, stiff neck, nausea, vomiting, photophobia (eyes being more sensitive to light), or altered mental status (confusion).
    - **Symptoms of meningococcal bloodstream infection** may include fever and chills, fatigue, vomiting, cold hands and feet, severe aches and pains, rapid breathing, diarrhea, or, in later stages, a dark purple rash.
    - **Initial symptoms of meningococcal disease** can at first be vague, but worsen rapidly, and can become life-threatening within hours.

For More Information

Healthcare Providers

- Clinical Information | Meningococcal Disease | CDC
- Meningococcal Vaccination: Information for Healthcare Professionals | CDC
- Meningococcal Disease | CDC Yellow Book 2024

Health Departments

- Meningococcal Disease Surveillance | CDC
- Meningococcal Disease | Manual for the Surveillance of Vaccine-Preventable Diseases | CDC
- Meningococcal Disease Outbreaks and Public Health Response | CDC

Public

- Meningococcal Vaccination | CDC
- Signs and Symptoms | Meningococcal Disease | CDC
- Travelers' Health: Saudi Arabia | CDC
- Ministry of Health, Kingdom of Saudi Arabia
- Visit CDC-INFO or call 1-800-232-4636

References

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The Centers for Disease Control and Prevention (CDC) protects people's health and safety by preventing and controlling diseases and injuries; enhances health decisions by providing credible information on critical health issues; and promotes healthy living through strong partnerships with local, national, and international organizations.

Categories of Health Alert Network messages

Health Alert	Conveys the highest level of importance about a public health incident.
Health Advisory	Provides important information about a public health incident.
Health Update	Provides updated information about a public health incident.