The A.C.D. Quarterly

PHILADELPHIA DEPARTMENT OF PUBLIC HEALTH

MARCH 13, 2014 VOLUME 3: ISSUE 1

Middle East Respiratory Syndrome: A Novel Coronavirus

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Coronaviruses are microorganisms named for the crown-like spikes on their surface (see Fig. 1). Infections with a coronavirus typically result in mild to moderate upper-respiratory tract illness in humans. Middle East Respiratory Syndrome, or MERS-CoV, is a novel coronavirus, meaning that it has never before been reported in humans. MERS-CoV is distinct from the virus which caused an epidemic of Severe Acute Respiratory Syndrome (SARS) virus in 2003. However, like SARS, MERS-CoV causes severe respiratory illness and pneumonia in most reported cases. Dr. Ali Mohamed Zaki, an Egyptian virologist working in Saudi Arabia, was the first to isolate the novel coronavirus from an infected patient. His findings were reported in September 2012[1], although cases of a SARS-like illness were being identified as early as April 2012[2]. Since then the virus has been detected in ten countries across the Middle East and Europe, although all confirmed cases of MERS-CoV have been linked to four countries near or in the Arabian Peninsula. As of March 11, 2014, there have been a total of 186 laboratory-confirmed cases of MERS-CoV, including 81 deaths[3]. At present, **no cases have been reported in the United States.**

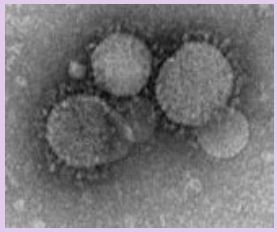

Figure 1. Image of MERS-CoV

The majority of people with MERS-CoV develop severe acute respiratory illness (SARI), usually requiring hospitalization, and exhibit symptoms such as fever, cough, and shortness of breath. Gastrointestinal symptoms such as diarrhea and vomiting are also common. Severe complications of MERS-CoV include acute renal failure and acute respiratory distress syndrome (ARDS). While the source of MERS-CoV remains unknown, evidence for an animal origin is growing. During an investigation in October 2013, researchers captured a bat that showed 100% nucleotide identity to the virus from the human index case-patient[4]. Although no patients have reported direct contact with bats, this study posits that bats could have indirect contact with humans, either through a different animal vector or a fomite[4]. Subsequent studies have suggested camels as a possible intermediate source. Several researchers have found MERS-CoV antibodies in camels in several Middle Eastern countires[5,6], and a study conducted in October 2013 provided the first virological confirmation of MERS-CoV in camels[7]. However, despite increasing support for a zoonotic link, **potential animal reservoirs and mechanisms of transmission of MERS-CoV to humans still remain unclear**. There is also evidence that shows the virus can be spread from person to person through close contact, as well as from patients to healthcare providers with unprotected exposure[8]. Currently, MERS-CoV has not been shown to spread in a sustained way in communities, but investigations are still being conducted to better understand person to person transmission.

There is no vaccine or specific antiviral treatment for MERS-CoV. However, the Centers for Disease Control and Prevention (CDC) is participating in a working group led by the National Institutes of Health (NIH) to address vaccine development, antiviral treatment, and other possible treatments. Public health agencies around the world are also now performing contact tracing and epidemiological investigations for confirmed cases. The World Health Organization (WHO) continues to provide frequent updates for MERS-CoV cases and fatalities.

Recommendations for Healthcare Providers

A patient who should be considered for MERS-CoV infection, or **Patient Under Investigation (PUI)**, is a person who meets the following criteria:

- Fever (> or = 38 C 100.4 F) and pneumonia or ARDS

  And Either

- History of travel from countries in or near the Arabian Peninsula within 14 days before symptom onset

  Or

- Close contact with a symptomatic traveler who developed fever and acute respiratory illness

  Or

- Is a member of a cluster of patients with SARI

Immediately report any PUIs to the Philadelphia Department of Public Health
215-685-6748 or 215-686-4514 (after hours)

With multiple healthcare-associated clusters identified, infection control remains the primary means of preventing and controlling MERS.

- Use droplet precautions when caring for patients with SARI
- Add contact precautions and eye protection when caring for PUIs
- Provide regular infection prevention and control education and training to all healthcare workers
- Note that the presence of another respiratory pathogen does not necessarily preclude testing for MERS-CoV[9]
- Collect multiple specimens from upper and lower respiratory tracts at different times after symptom onset (stool and serum samples are also recommended)[9].

For more information, please visit
www.cdc.gov/coronavirus/mers/

ACD: Year in Review

One of the many pleasures of working with the Acute Communicable Disease (ACD) Program at the Philadelphia Department of Public Health is the diversity of activities pursued through a strong team environment and public/private partnership. The year 2013 was no exception. The ACD program continued its primary role in the surveillance and investigation of enteric, vector-borne, vaccine-preventable, and emerging infections and outbreaks and also sustained several prevention activities. A new multidrug resistant organism (MDRO) prevention initiative was also started in response to increasing reports of MDRO outbreaks and emerging threat analyses. This article provides a reflection on our 2013 activities including key highlights and outbreaks and our outlook for 2014.

The ACD program consists of four disease surveillance investigators led by an investigation supervisor, four masters level epidemiologists who coordinate surveillance and response activities for more specific subject matter, and two program assistants that support enhanced surveillance activities in varicella and hepatitis C. This year we welcomed a CDC/CSTE fellow and two CDC Public Health Associates to our team. The addition of fellows and PHAPs in the wake of diminishing federal funding has allowed our program to expand surveillance, investigation, and prevention activities.

Key highlights from 2013 include our pilot prevention and outreach activities to address healthcare associated infections (HAIs) and Lyme disease. The Philadelphia Department of Public Health is one of four pilot sites sponsored by the National Association for City and County Health Officials to identify methods in which local health departments can become engaged in more proactive HAI prevention activities. For our first year, ACD had a primary focus on carbapenem-resistant enterobacteriaceae (CRE) prevention. To this end, PDPH carried out brief surveys with acute and long term care infection preventionists to identify an estimate of CRE prevalence, current CRE infection prevention activities, and regional needs. Furthermore, PDPH convened an advisory group of various local practitioners of antimicrobial stewardship and MDRO prevention and control to help address regional needs in this area and shape an agenda for a CRE symposium held in October 2014.

Additional educational highlights included a Fight the Bite awareness campaign designed to prevent tick-borne diseases and West Nile Virus. ACD also partnered with the Centers for Disease Control and Prevention in a pilot project to train nursing and medical professional students in Lyme disease clinical presentation, testing, and prevention. The project, entitled Lyme Corps, sought to utilize students trained as local Lyme disease experts in assisting PDPH with education of Philadelphia primary care providers.

Apart from prevention and education initiatives, ACD concluded a two year hepatitis C (HCV) in young adults surveillance pilot project. Results of data collected from this project, specifically a high frequency of injection drug use and tattoos in unlicensed settings among new HCV reports, are driving future interventional activities. Additionally, methods used in surveillance are being shared with other health departments seeking to carry out similar efforts.

Surveillance has many benefits including aiding in the detection of outbreaks. Outbreak investigations are among the hallmark functions of the ACD program. In 2013, ACD investigated over 47 institutional outbreaks of influenza and norovirus, at least three foodborne outbreaks linked to restaurant establishments, and one of the largest outbreaks of HCV seroconversion in a hemodialysis facility. ACD also went beyond traditional infectious diseases in investigating an outbreak of photokeratitis linked to exposure to UV radiation at a recreation center. Results from outbreak investigations are used to drive continued process improvement models and awareness.

In the coming year ACD plans to continue its outreach in the areas of antibiotic stewardship, dialysis infection prevention, and tickborne infections. ACD will also seek to explore the utility of advanced molecular diagnostics in epidemiological investigations by working with state and federal public health laboratories. These efforts and the success of the work that is done by our program would not be possible without the contribution of healthcare providers, laboratorians, and all other members of the public health community that support our reporting requirements and investigation needs. We look forward to strengthening our partnership in the coming year and invite you to join our efforts.

REPORT OUTBREAKS AND REPORTABLE DISEASES AND CONDITIONS TO PDPH

PHONE: (215) 685-6748

FAX: (215) 238-6947

Reporting requirements and forms are posted online at https://hip.phila.gov/xv/

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