



JOHNS HOPKINS

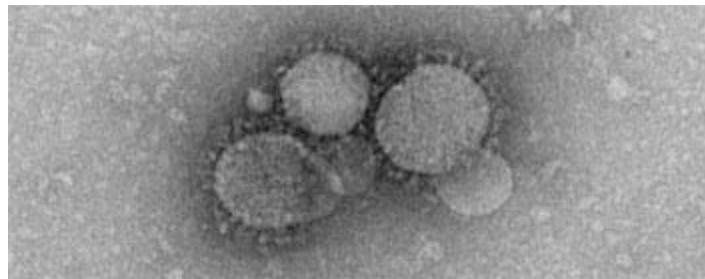
M E D I C I N E

JOHNS HOPKINS
HEALTH SYSTEM

Middle East Respiratory Syndrome Coronavirus (MERS-CoV)

Background

- What is Middle East respiratory syndrome (MERS)?
 - MERS is a coronavirus (named for the crown-like projections on the virus surface).
 - Coronaviruses are very common and usually cause colds and mild upper respiratory infections but can also cause severe illness like the 2003 SARS-CoV.
 - MERS is related to but is not the same as SARS.
 - First identified– late 2012 in Saudi Arabia



Signs and Symptoms of MERS

- Fever > 38C (100.4F)
- Cough
- Shortness of breath
- Malaise
- Vomiting
- Diarrhea
- Pneumonia
- Incubation period about 5.2 days but can range up to 14 days.
- Symptoms range from mild – severe.
- Mean age: 56

CDC Criteria for Suspect Cases

A Patient Under Investigation (PUI) is a person with:

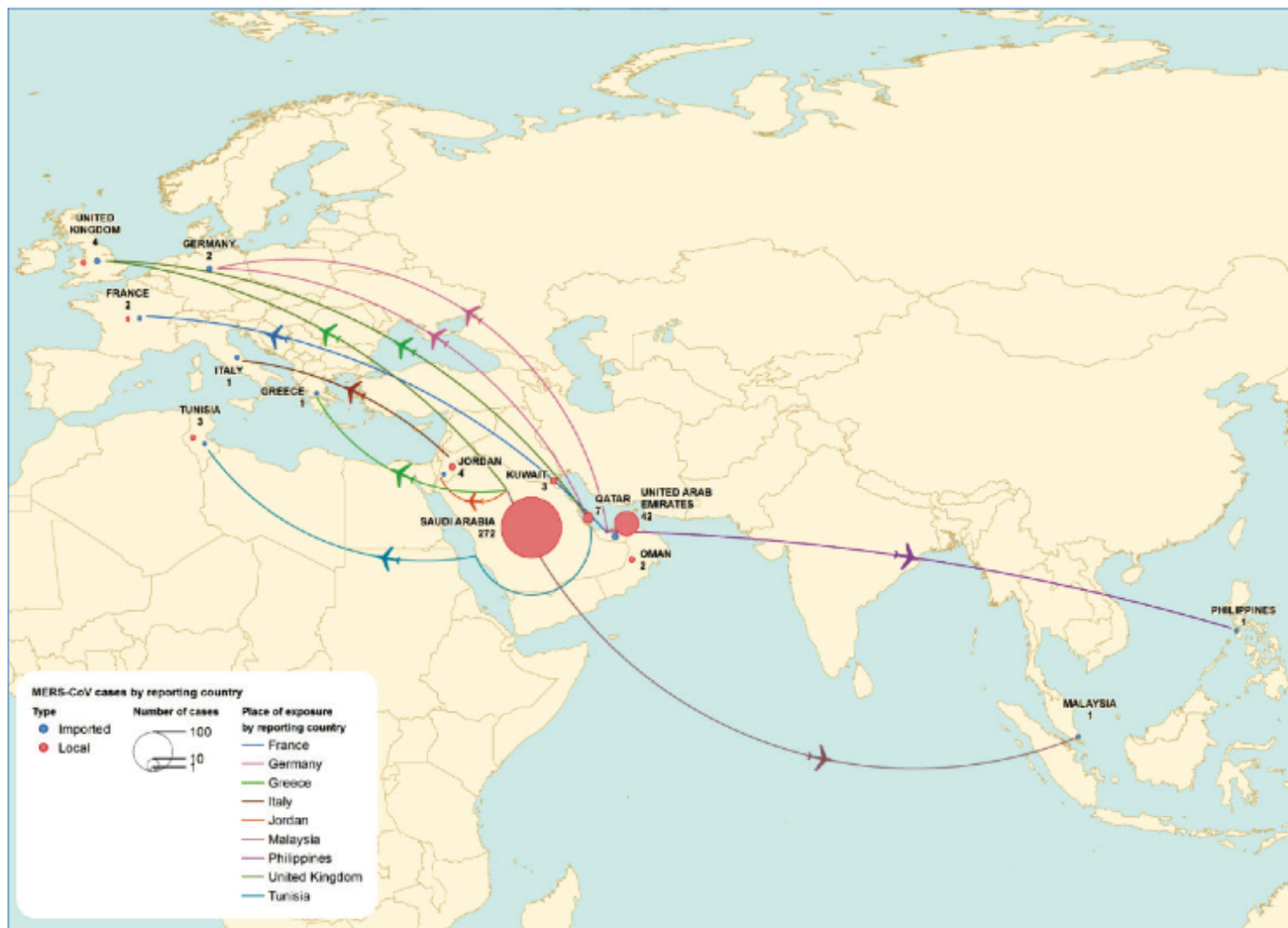
- an acute respiratory infection, which may include fever ($\geq 38^{\circ}\text{C}$, 100.4°F) and cough; AND
- suspicion of pulmonary parenchymal disease (e.g., pneumonia or acute respiratory distress syndrome based on clinical or radiological evidence of consolidation); AND
- history of travel from the Arabian Peninsula or neighboring countries* within 14 days; AND
- not already explained by any other infection or etiology, including all clinically indicated tests for community-acquired pneumonia** according to local management guidelines.

Location of Cases



- Most cases are either found in or linked to the eastern provinces of Saudi Arabia.
- Countries considered in or near the Arabian Peninsula; Bahrain, Iraq, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Palestinian territories, Qatar, Saudi Arabia, Syria, the UAE and Yemen
- No cases in the United States to this point.

Figure 4. Geographic distribution of confirmed MERS-CoV cases, worldwide, as of 23 April 2014 (n=345)



Most of the latest cases reported from the UAE are linked to a cluster in a hospital in Al Ain where 16 healthcare workers (including one case exposed in UAE and reported by the Philippines) have tested positive for MERS-CoV. All these cases are linked to a previously reported case, who died on 10 April 2014.

Other Countries Reporting Cases



From: RAPID RISK ASSESSMENT Severe respiratory disease associated with MERS-CoV, June 2013 *European Centre for Disease Prevention and Control, Stockholm, 2013.*

<http://www.ecdc.europa.eu/en/publications/publications/mers-cov-novel-coronavirus-risk-assessment.pdf>

Reporting country	Cases	Deaths
Saudi Arabia	272	81
United Arab Emirates	42	9
Qatar	7	4
Jordan	4	3
Oman	2	2
Kuwait	3	1
United Kingdom	4	3
Germany	2	1
France	2	1
Italy	1	0
Tunisia	3	1
Malaysia	1	1
Philippines	1	0
Greece	1	0
Total	345	107

Figure 1. Distribution of confirmed cases of MERS-CoV by month of onset and symptom status, March 2012–23 April 2014 (n=345*)

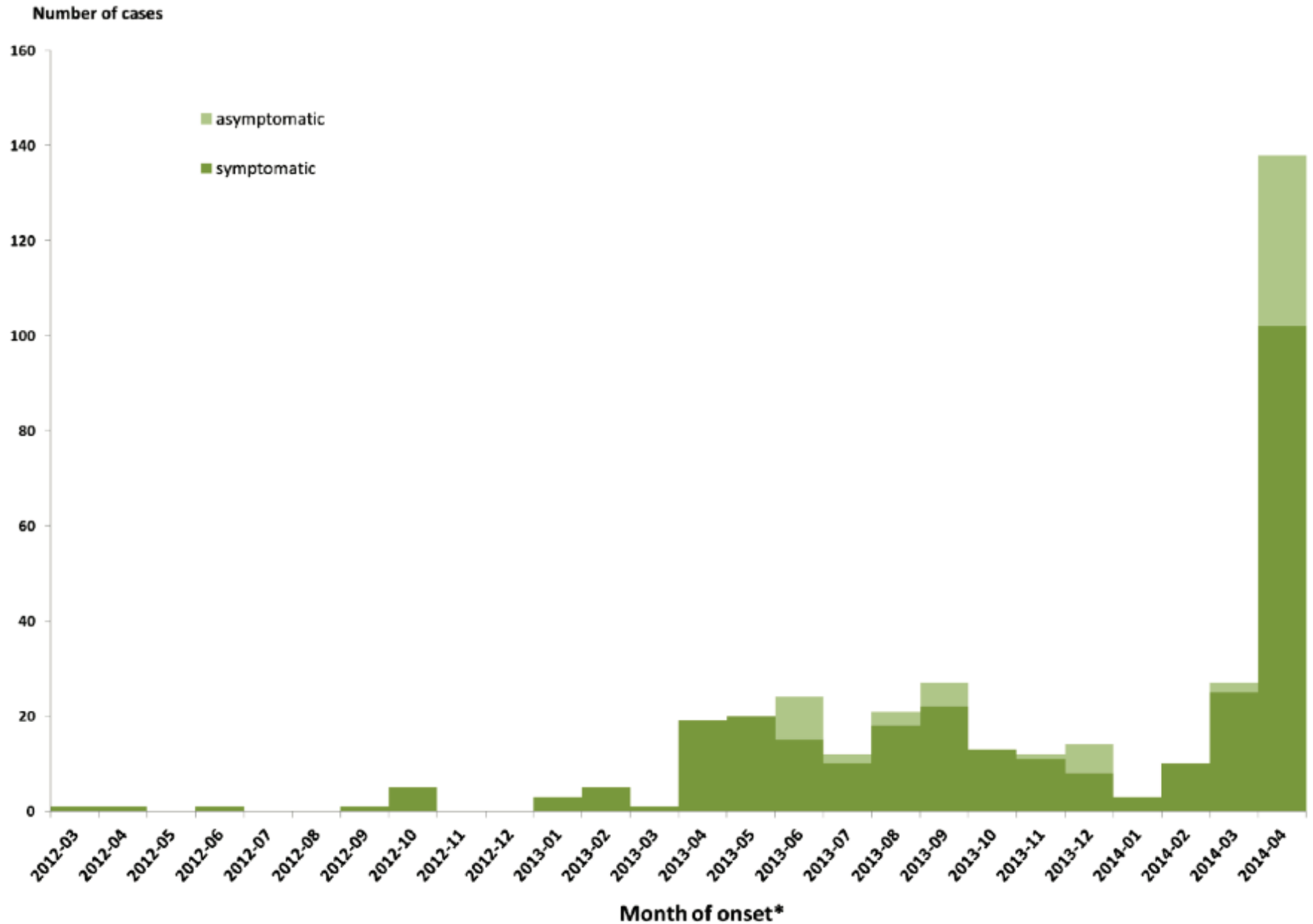
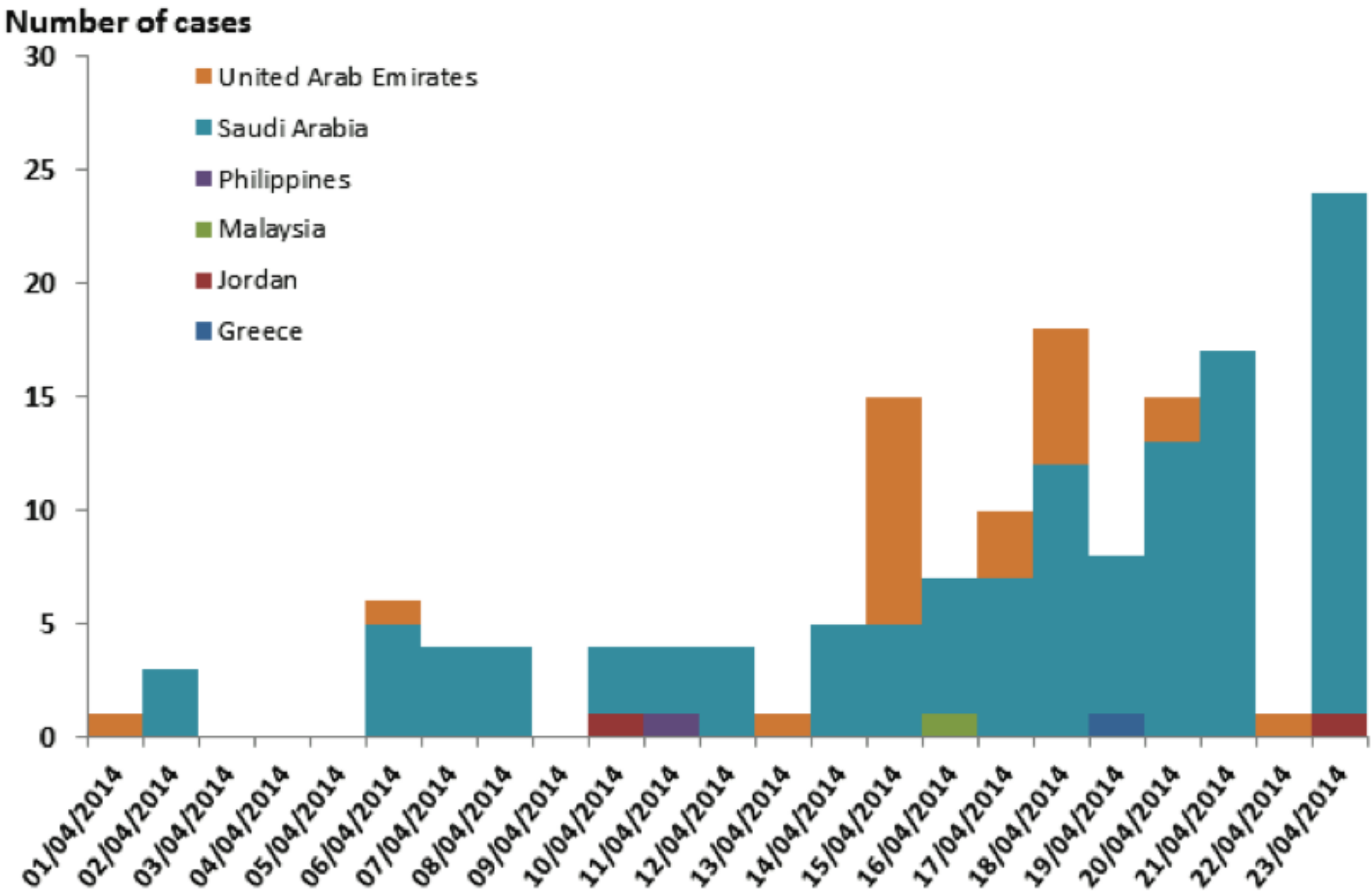


Figure 3. Distribution of confirmed cases of MERS-CoV reported between 1 and 23 April 2014 by date and place of reporting (n=151)



Ongoing Concerns

- Exact route of transmission is still unclear.
- High attack-rate.
- No definitive treatment yet.
- Documented nosocomial transmission from patient to patient and from patient to healthcare workers.
- Few definitive lab tests and surveillance tools available

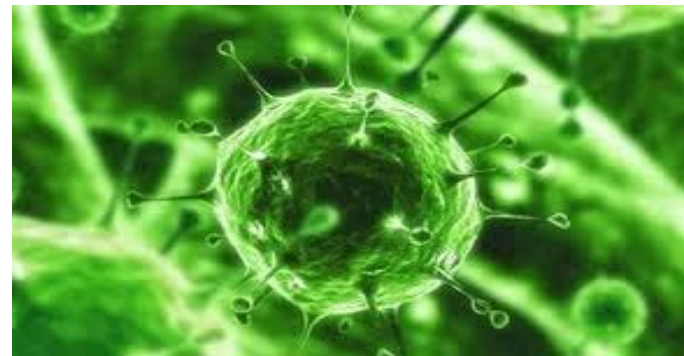


CDC Guidance

- State labs were sent materials to test for MERS virus from CDC.
- For inpatient suspected cases: airborne, droplet and contact precautions.
- Cases that meet the criteria for “patient under investigation” must be reported to the state and CDC.
- No travel restrictions or border screening have been announced at this time.

Quick Factoids

- Recent Infections are milder
- Mortality has been decreasing
- 75% of recent cases are in the health care setting
- 75% are secondary transmissions
- Only 2 cases known to be tertiary
 - Anecdotally more
- Season spike is expected



Johns Hopkins Institutions' (CEPAR) Pandemic Stages

Geographic Distribution	World	North America	Regional	JHI
Severity	Confirmed human outbreak with sustained person- to-person transmission: U.S. Stage 1- 3 WHO Phase 4 or 5	First human cases in the U.S., Canada, Mexico: U.S. Stage 4 or 5 WHO Phase 6	Cases spread throughout MD, DC, DE, VA, WV, PA, NYC: U.S. Stage 5 or 6 WHO Phase 6	Cases within the JHHS or the University, including APL.
Low Low infectivity Low morbidity Low mortality	Alert Stage	Alert Stage	Transitional Stage	Transitional Stage
Moderate Low infectivity and high morbidity/high mortality OR	Alert Stage	Transitional Stage	Transitional Stage	Transitional Stage
Moderate High infectivity and low morbidity/low mortality	Alert Stage	Transitional Stage	Transitional Stage	Transitional Stage
High High infectivity High morbidity/high mortality	Transitional Stage	Transitional Stage	Critical Stage	Critical Stage

What is Hopkins Doing?

- We've been here before
 - Smallpox scare 2003
 - SARS
 - Avian Flu
 - H1N1
 - MERS CoV 2012, 2013
- Close Monitoring
- Heightened Awareness Communications
- Targeted Testing Expanded
- No Restriction in Travel (WHO, CDC)
 - Monitoring on return

Screening

- Fever, PNA, or ARDS
- Hx of travel from Arabian Peninsula <14 d
- Close contact with symptomatic traveler as above <14 d

Bahrain, Iraq, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Palestinian territories, Qatar, Saudi Arabia, Syria, the United Arab Emirates (UAE), and Yemen).

Reference Articles

- <http://www.cdc.gov/features/novelcoronavirus/>
- Assiri A, McGeer A, **Perl** TM, Price CS, Al Rabeeah AA, Cummings DA, Alabdullatif ZN, Assad M, Almulhim A, Makhdoom H, Madani H, Alhakeem R, Al-Tawfiq JA, Cotten M, Watson SJ, Kellam P, Zumla AI, Memish ZA; the KSA MERS-CoV Investigation Team. *Hospital Outbreak of Middle East Respiratory Syndrome Coronavirus*. N Engl J Med. 2013 Jun 19. [Epub ahead of print].
- Guery B, Poissy J, El Mansouf L, Séjourné C, Ettahar N, Lemaire X, Vuotto F, Goffard A, Behillil S, Enouf V, Caro V, Mailles A, Che D, Manuguerra JC, Mathieu D, Fontanet A, van der Werf S; the MERS-CoV study group. *Clinical features and viral diagnosis of two cases of infection with Middle East Respiratory Syndrome coronavirus: a report of nosocomial transmission*. Lancet. 2013 May 30. doi:pii: S0140-6736(13)60982-4. 10.1016/S0140-6736(13)60982-4.
- Memish ZA, Zumla AI, Al-Hakeem RF, Al-Rabeeah AA, Stephens GM. *Family Cluster of Middle East Respiratory Syndrome Coronavirus Infections*. N Engl J Med. 2013 May 29.
- http://www.who.int/csr/don/2013_06_23/en/index.html.