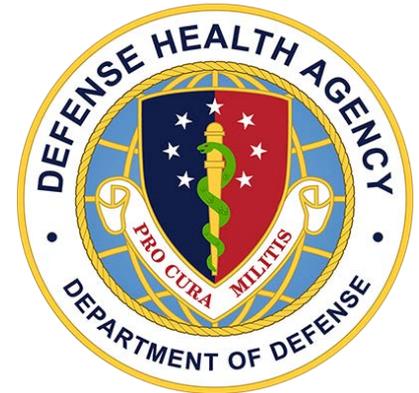


Department of Defense
Armed Forces Health Surveillance Branch
Global MERS-CoV Surveillance Summary
(24 AUG 2016)



APPROVED FOR PUBLIC RELEASE

For questions or comments, please contact:

dha.ncr.health-surv.list.afhs-ib-alert-response@mail.mil



DEPARTMENT OF DEFENSE (AFHSB)

Global MERS-CoV Surveillance Summary #90

24 AUG 2016 (next Summary 7 SEP)



CASE REPORT: As of 24 AUG 2016, 1,875 (+3) cases of Middle East respiratory syndrome coronavirus (MERS-CoV) have been reported, including at least 578 deaths (CDC reports at least 665 deaths as of 24 AUG) in the Kingdom of Saudi Arabia (KSA) (+2), Jordan, Qatar, United Arab Emirates (UAE), United Kingdom (UK), France, Germany, Tunisia, Italy, Oman, Kuwait, Yemen, Malaysia, Greece, Philippines, Egypt, Lebanon, Netherlands, Iran, Algeria, Austria, Turkey, Republic of Korea (ROK) (+1), China, Thailand, Bahrain, and the U.S. A confirmed case of MERS-CoV was identified on 31 JUL in a Kuwaiti individual traveling in Thailand; he has since recovered and been released. The two previously quarantined family members of this case have also been released. This is Thailand's third case of MERS-CoV. According to local media reports, a suspected case of MERS-CoV was identified on 17 AUG in Gwangju City, ROK, in a man who had recent travel to UAE. The individual has been placed in isolation at a state-run hospital, pending confirmatory tests. AFHSB considers this a suspect case, and has included it in the above case count. If tests confirm a MERS-CoV diagnosis, this will be the first case reported in ROK in 2016. AFHSB's death count (Case Fatality Proportion (CFP) - 31%) includes only those deaths which have been publicly reported and verified. While CDC's death count (CFP - 37%) may present a more complete picture, it's unclear when and where those additional deaths occurred during the outbreak.

DIAGNOSTICS/MEDICAL COUNTERMEASURES: On 8 AUG, GeneOne Life Science (based in ROK) and U.S.-based Inovio Pharmaceuticals announced that full enrollment had been reached for the first human clinical trial of a MERS-CoV vaccine (GLS-5300). The Phase I clinical trial is being funded by the Walter Reed Army Institute of Research (WRAIR), and will be conducted at WRAIR's Clinical Trials Center in Silver Spring, MD. SAB Biotherapeutics recently announced that Phase I clinical trials for its human antibody treatment (SAB-301) are underway; while antibodies to MERS-CoV have been developed using animals, SAB is the first to produce fully human antibodies in large animals (cattle). This study is funded and will be conducted by the National Institutes of Health (NIH). Regeneron Pharmaceuticals and the Biomedical Advanced Research and Development Authority (BARDA) of the U.S. Department of Health and Human Services (HHS) have developed a pair of antibodies to prevent and treat MERS-CoV. HHS has agreed to provide up to \$8.9 million in funding to Regeneron to help back manufacturing, Investigational New Drug (IND) submission, and a clinical trial conducted by the NIH.

On 17 AUG, Alpha Diagnostic International announced its recent development of multiple ELISA test kits for screening MERS-CoV infections in humans and animals; the kits are intended for in vitro research use only, not for diagnostic procedures.

INTERAGENCY/GLOBAL ACTIONS: WHO convened the Tenth International Health Regulations (IHR) Emergency Committee on 2 SEP 2015 and concluded the conditions for a Public Health Emergency of International Concern (PHEIC) had not yet been met. However, the Committee also emphasized that they still have concerns as transmission from camels to humans continues in some countries, instances of human-to-human transmission continue to occur in health care settings, and asymptomatic cases are not always being reported as required. On 13 JUL, CDC released updated guidance for the monitoring and movement of potential MERS-CoV cases, including a table with specific guidance for public health actions based on exposure category and clinical criteria. A new study published in CDC EID describes the comprehensive investigation undertaken by the Guangdong Center for Disease Control and Prevention after an imported case of MERS-CoV, linked to the outbreak in the ROK, was confirmed in China in 2015. Because of timely notification from ROK and the WHO, which enabled health authorities in China to prepare for the patient's admission to hospital, as well as intensive contact tracing, health authorities in China were able to successfully prevent any secondary transmission of MERS-CoV.

Text updated from the previous report will be printed in red; items in (+xx) represent the change in number from the previous Summary (10 AUG 2016).

All information has been verified unless noted otherwise. For questions or comments, please contact: dha.ncr.health-surv.list.afhs-ib-alert-response@mail.mil

APPROVED FOR PUBLIC RELEASE



DEPARTMENT OF DEFENSE (AFHSB)

Global MERS-CoV Surveillance Summary #90

24 AUG 2016 (next Summary 7 SEP)



BACKGROUND: In SEP 2012, [WHO reported two cases of a novel coronavirus](#) (now known as MERS-CoV) from separate individuals – one with travel history to the KSA and Qatar and one in a KSA citizen. This was the sixth strain of human coronavirus identified (including SARS). Limited human-to-human transmission has been identified in at least 51 spatial clusters predominately involving close contacts. Limited camel-to-human transmission of MERS-CoV has been proven to occur. The most recent known date of symptom onset is 8 JUL 2016. A recent article in Infectious Disease News described the ongoing difficulty in explaining primary cases in which the patient has no known exposure to a camel, healthcare setting, or other MERS-CoV infected individual; this issue is particularly relevant as at least 13 primary cases have been reported in KSA since the nosocomial cluster in Riyadh ended in late JUN. Of the 558 cases reported between 1 JAN 2015 and 5 JUN 2016, the authors noted only 11.5 percent were reported as having exposure to a camel. The KSA Ministry of Health (MOH) has previously admitted to inconsistent reporting of asymptomatic cases. Due to these inconsistencies, it is also difficult to determine a cumulative breakdown by gender; however, AFHSB is aware of at least 587 cases in females to date. CDC reports 304 of the total cases have been identified as healthcare workers (HCWs). A joint study by the Health Authority of Abu Dhabi, UAE, and the U.S. CDC retrospectively analyzed medical data on MERS-CoV patients in UAE from JAN 2013 to MAY 2014, and found that mild and asymptomatic MERS-CoV cases made up the majority (35% and 35% respectively) of UAE's cases in this time period (65 cases), and that many of these mild/asymptomatic individuals were shown to shed the virus for longer than two weeks.

A [study](#) published by CDC found that antibodies to MERS-CoV can persist for up to 34 months after infection; furthermore, observed differences in immunologic responses to MERS-CoV exposure and infection suggest a potential role for genetic factors in the immune response. **A new study published in the Proceedings of the National Academy of Sciences identified one of the four globally endemic human coronaviruses responsible for the common cold, HCoV-229E, in ~58 of 1,033 (5.6 percent) MERS-CoV infected camels tested. The discovery that this coronavirus originated in camels may have significant implications for the pandemic potential of the MERS coronavirus, which is thought to be caused by camels but does not currently demonstrate sustained human-to-human transmission.** On 4 MAR, CDC published a [study](#) that tested archived serum (from 2013-2014) from livestock handlers in Kenya for MERS-CoV antibodies to search for autochthonous MERS-CoV infections in humans outside of the Arabian Peninsula. The study found two (out of 1,122 samples) tested positive, providing evidence of previously unrecorded human MERS-CoV infections in Kenya. On 22 JUN, FAO reported that, to date, field surveys have identified MERS-CoV seropositive livestock in the following countries: Spain (the Canary Islands), Nigeria, Tunisia, Ethiopia, Somalia, Kenya, Sudan, Egypt, Jordan, KSA, Oman, and UAE. A recent study in Tropical Animal Health and Production found that dromedary camels from KSA show significantly higher MERS-CoV carrier rates than dromedaries imported from Africa. Additionally, the two MERS-CoV lineages identified in Nigerian camels were found to be genetically distinct from those strains currently circulating in the Arabian Peninsula. These findings support the theory that camel imports from Africa are not contributing significantly to the circulation of MERS-CoV in camels in the Arabian Peninsula. **A new study found that goats, sheep, and horses are unlikely to have productive viral shedding after exposure to MERS-CoV and do not play an important role in viral transmission.**

Text updated from the previous report will be printed in red; items in (+xx) represent the change in number from the previous Summary (10 AUG 2016).

All information has been verified unless noted otherwise. For questions or comments, please contact: dha.ncr.health-surv.list.afhs-ib-alert-response@mail.mil

APPROVED FOR PUBLIC RELEASE



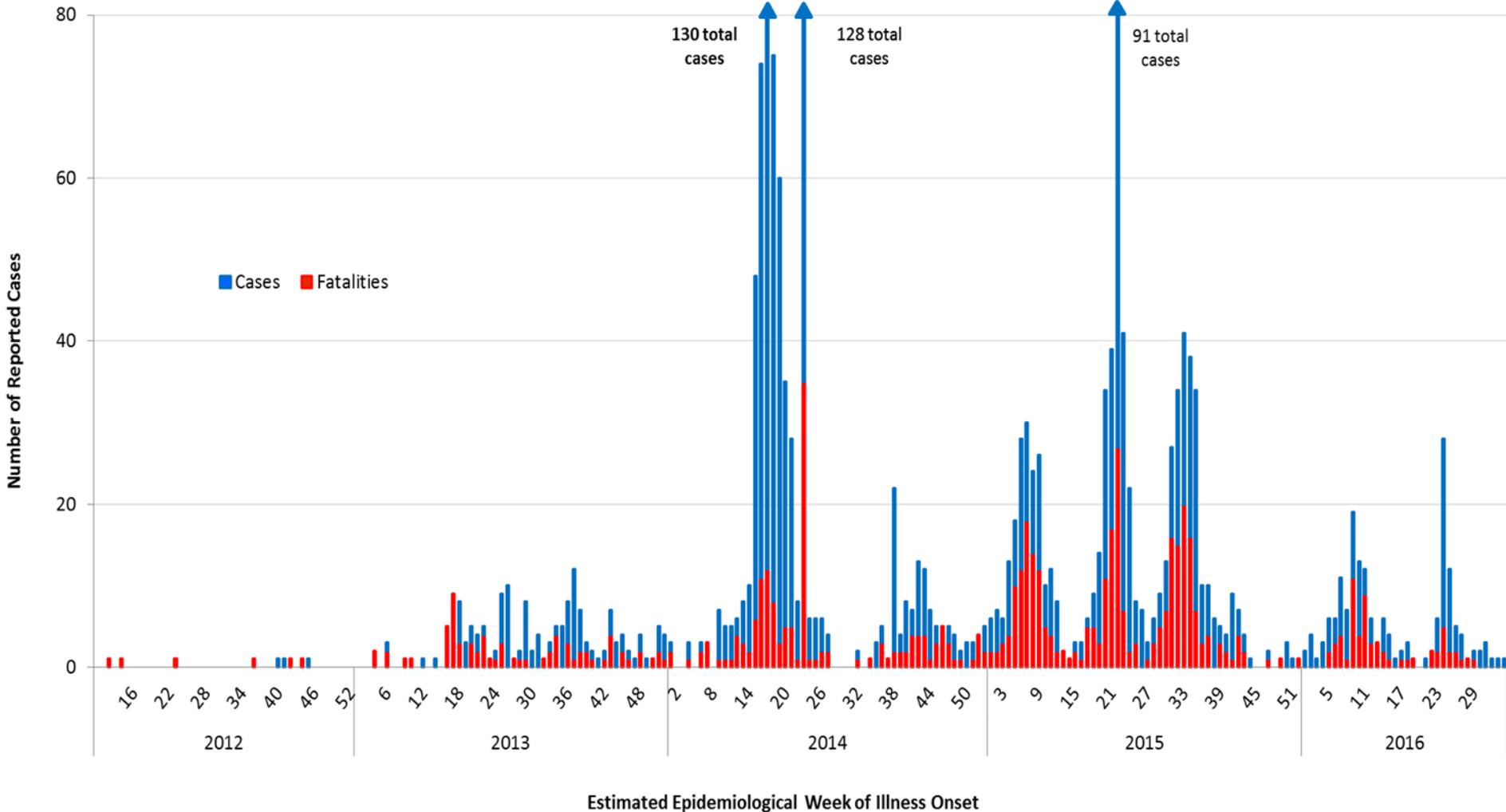
DEPARTMENT OF DEFENSE (AFHSB)

Global MERS-CoV Surveillance Summary #90

24 AUG 2016



Global MERS-CoV Epidemiological Curve by Illness Onset



[RETURN TO TOP](#)

For questions or comments, please contact: dha.ncr.health-surv.list.afhs-ib-alert-response@mail.mil

APPROVED FOR PUBLIC RELEASE



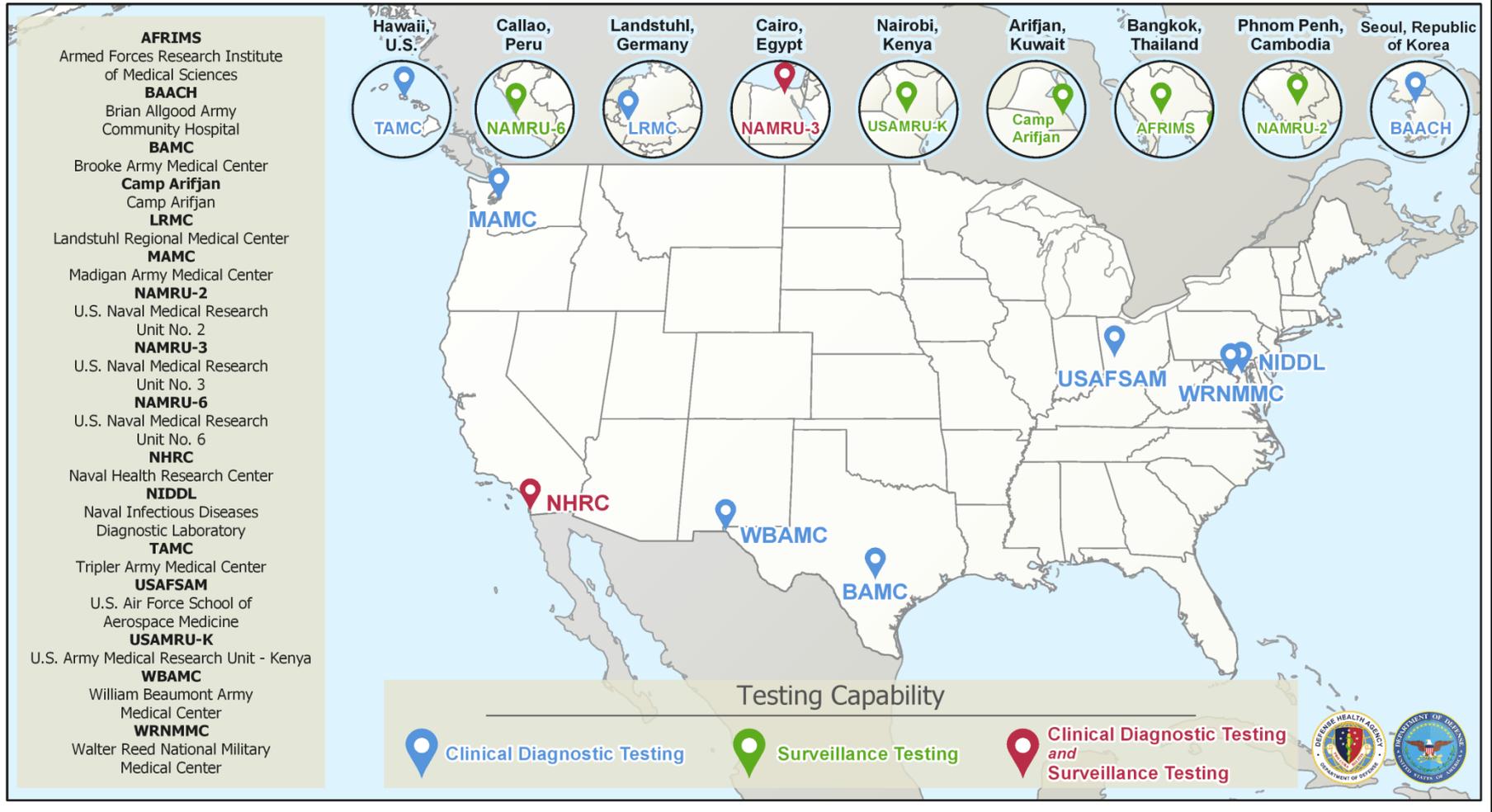
DEPARTMENT OF DEFENSE (AFHSB)

Global MERS-CoV Surveillance Summary #90

24 AUG 2016



MERS-CoV Diagnostics and Medical Countermeasures at DoD Laboratories



RETURN TO TOP

For questions or comments, please contact: dha.ncr.health-surv.list.afhs-ib-alert-response@mail.mil

APPROVED FOR PUBLIC RELEASE



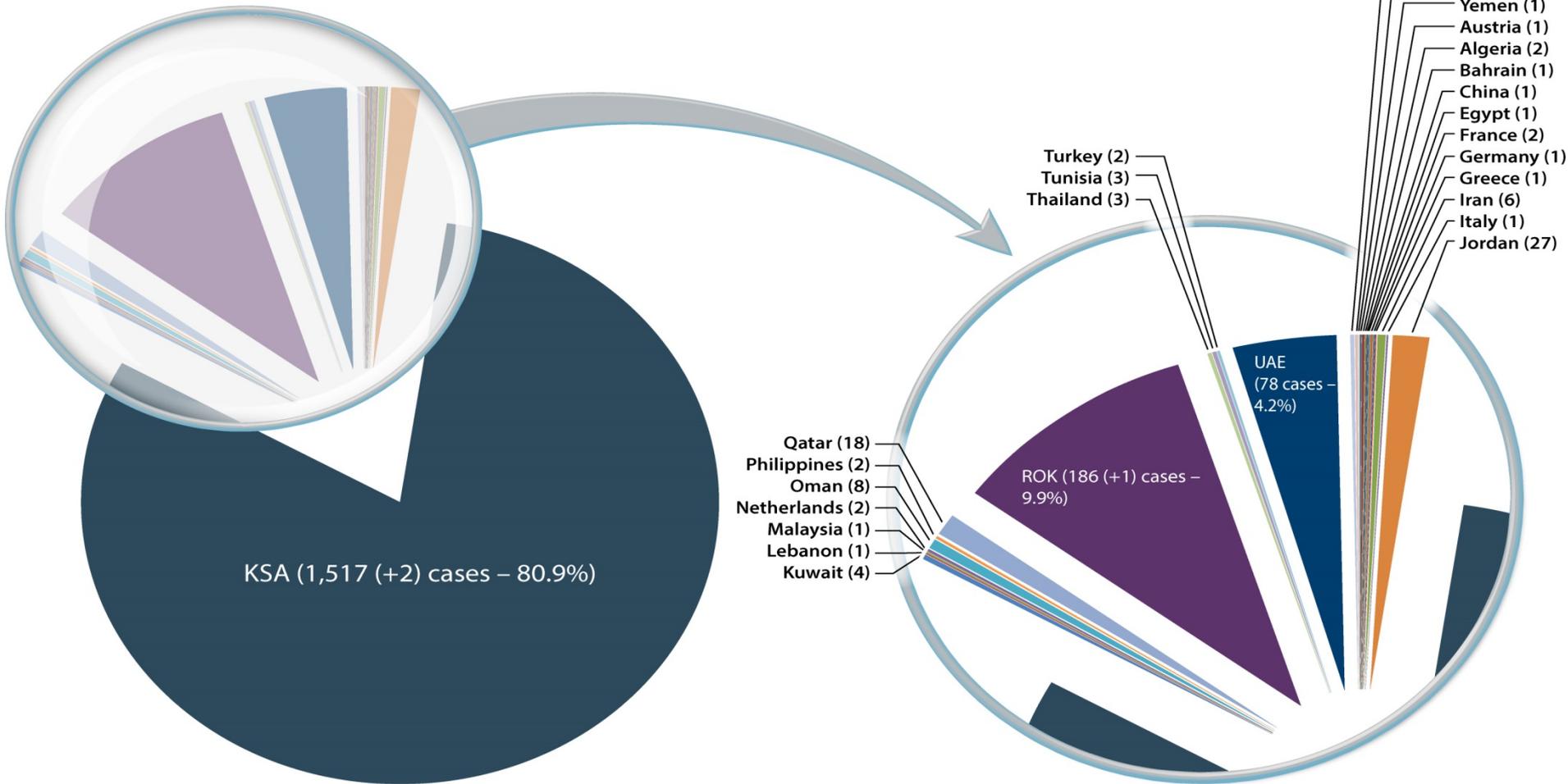
DEPARTMENT OF DEFENSE (AFHSB)

Global MERS-CoV Surveillance Summary #90

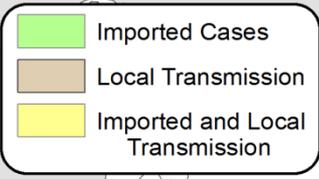
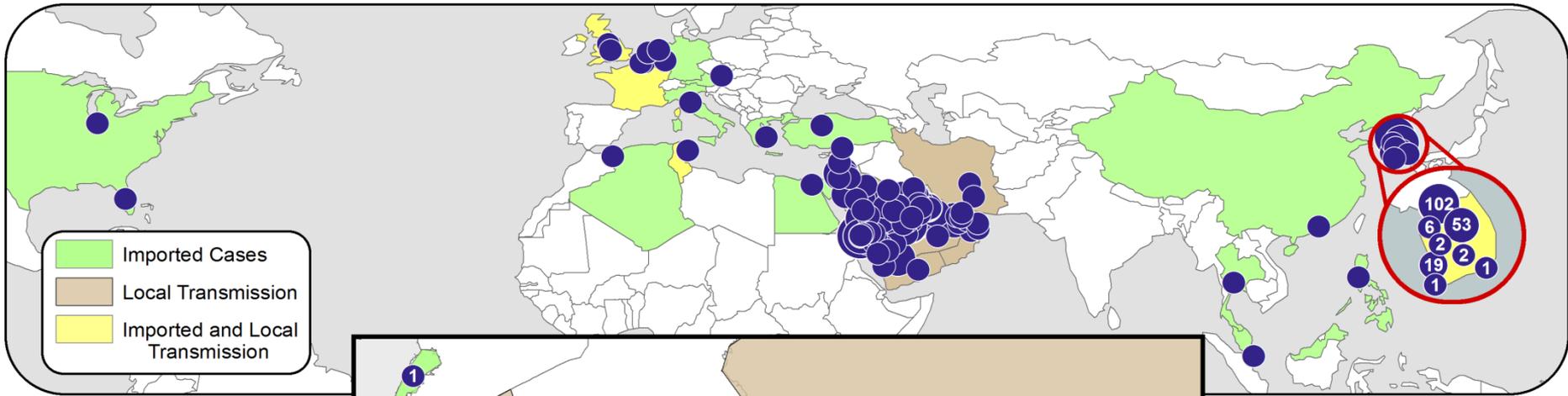
24 AUG 2016



Global Distribution of Reported MERS-CoV Cases* (SEP 2012–AUG 2016)



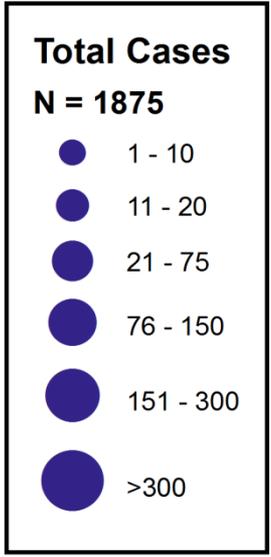
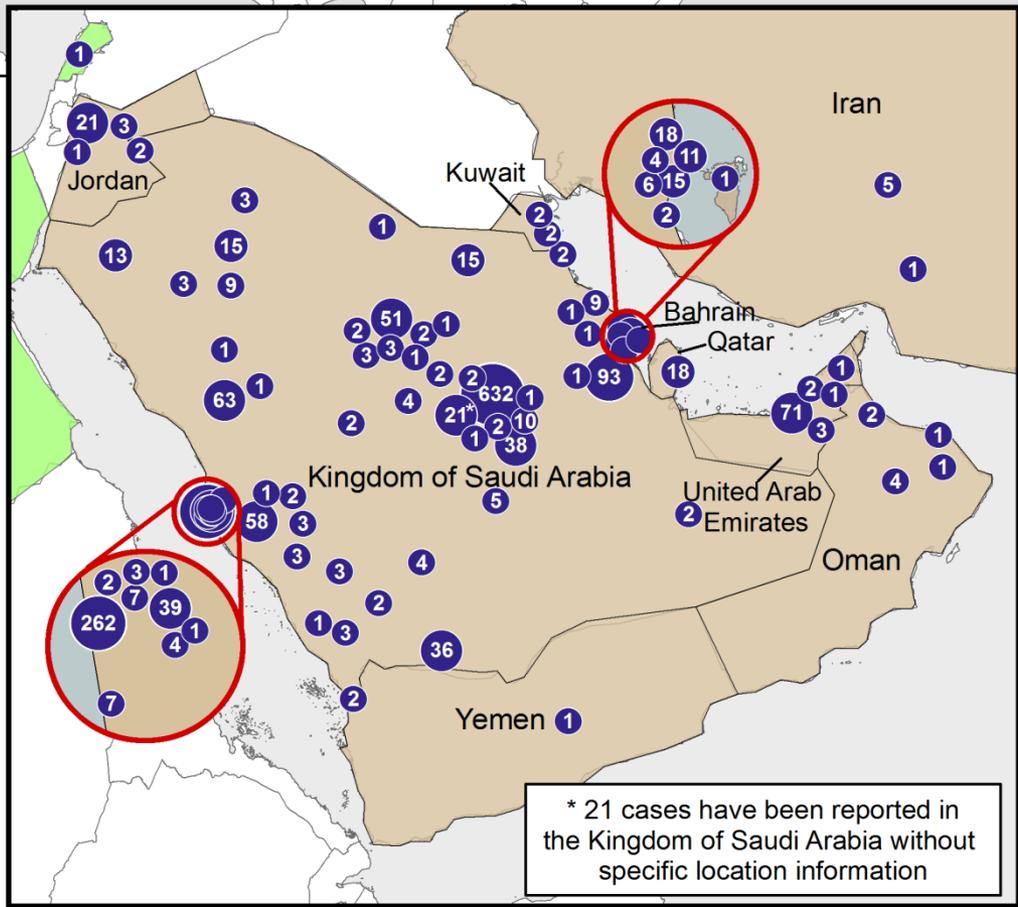
*Data includes confirmed, suspect and probable cases reported by WHO, CDC, and various country MOHs



Geographic Distribution of MERS-CoV Cases
01 APR 2012 - 24 AUG 2016



APPROVED FOR PUBLIC RELEASE



* 21 cases have been reported in the Kingdom of Saudi Arabia without specific location information

RETURN TO TOP

For questions or comments, please contact: dha.ncr.health-surv.list.afhs-ib-alert-response@mail.mil

APPROVED FOR PUBLIC RELEASE